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MATHEMATICS · JEE MAIN

Sets, Relations & Functions

Previous Year Questions with answers

321 questions · **187** papers · **2002–2026** · newest paper first

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What is in this PDF: every Sets, Relations & Functions question we hold from past JEE Main and AIEEE papers, with its options and answer. Where an answer comes from a source other than the official final key, it says so next to the answer.

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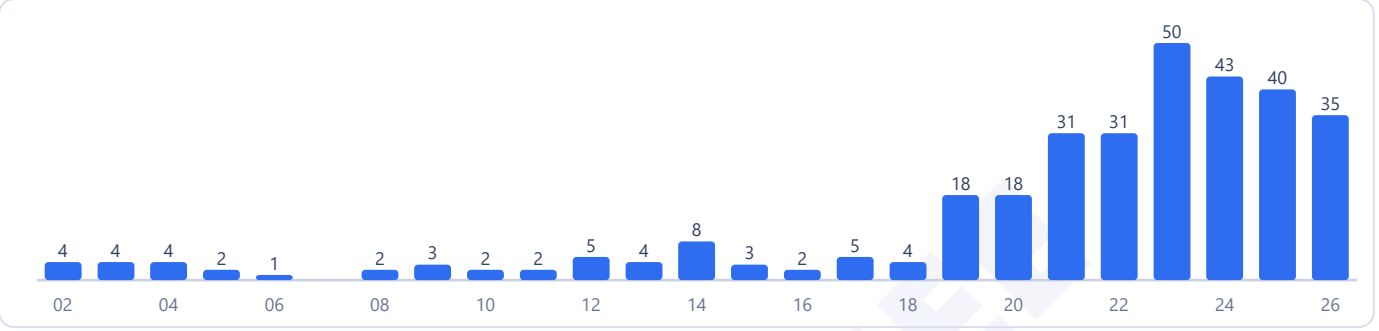
Chapter at a glance

5.8%	321	153 of 162	259 / 62
of Mathematics questions, 2019–2026	questions, 2002–2026	papers asked it, 2019–2026	MCQ / numerical, 2002–2026

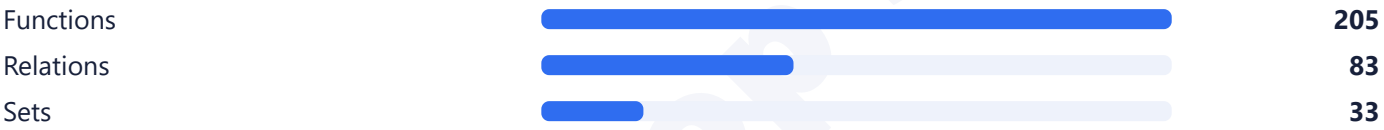
Trend. Rising: 2 questions per paper in 2024–2026 against 1.4 in 2019–2023.

Questions per year



Counts are the questions we hold: 321 in 187 papers. No question in this chapter was found repeated across papers.

Most-asked topics in this chapter (2002–2026)



How often it comes up

Sets, relations and functions provides the foundation for calculus and algebra under Unit 1: Sets, Relations and Functions in the Class 11 curriculum, capturing rank 2 of 29 chapters with a 5.8% share of the mathematics section. In the 2019 to 2026 testing window, Sets, Relations & Functions produced 266 questions across 162 exam papers, making up 5.8% of the mathematics section and capturing rank 2 of 29 chapters. During the 2002 to 2018 period, it contributed 55 questions across 38 papers with a 4.2% share. Across recent 2024 to 2026 sessions, it expanded dramatically to 118 questions across 58 papers, accounting for a 7.6% share. The chapter's appearance weight has trended up strongly across recent exam sessions.

The topic has appeared every year from 2019 to 2026. Across 2019 to 2026, students met an average of 1.6 questions per paper, rising to 2.0 questions per paper between 2024 and 2026. It yielded 62 numerical answer questions between 2019 and 2026, frequently requiring integer counting of relation pairs or mapping combinations.

Most-asked topics

The syllabus organizes across three fundamental areas:

- Functions: The largest topic with 205 total questions (170 in 2019 to 2026), evaluated continuously through 2026. Key themes include determining domain and range involving nested square roots, logarithms, and inverse trigonometric terms, checking injectivity and surjectivity, counting strictly monotonic mappings, greatest integer and fractional part evaluations, and solving Cauchy functional equations.
- Relations: Generated 83 total questions (70 in 2019 to 2026), tested through 2026. Focuses on testing reflexivity, symmetry, and transitivity on finite discrete sets or real intervals, counting minimum ordered pairs needed to transform a given relation into an equivalence relation, and total counts of equivalence relations.
- Sets: Produced 33 total questions (26 in 2019 to 2026), active through 2026. Examines algebraic set identities, subsets, power set cardinality, and three-set Venn diagram word problems involving inclusion-exclusion

principles.

What the questions look like

Examiners test both discrete relation counting and continuous algebraic analysis. A classic relation question defines an algebraic rule on a finite set of integers and asks how many ordered pairs must be added or removed to achieve symmetry, reflexivity, or transitivity.

In functions, problems regularly require finding the intersection of validity domains for square roots, fractional denominators, and logarithmic arguments. Other common problems present functional equations (such as f(x+y) = f(x)f(y) yielding an exponential function) and ask for the sum of a finite series over the integers.

How to practise it

Because this unit ranks second in mathematics weight, master discrete logic alongside continuous function manipulation:

1. Master relation properties: Check reflexivity (does (a,a) belong for all elements?), symmetry (does (a,b) imply (b,a)?), and transitivity (do (a,b) and (b,c) imply (a,c)?). Pay extra attention to vacuous transitivity when no chaining pair exists. 2. Calculate domains methodically: Break composite expressions into simultaneous inequalities: radicands of even roots must be non-negative; denominators cannot equal zero; logarithmic arguments must be strictly positive with positive bases not equal to one. 3. Test injectivity and surjectivity: For injectivity, verify whether f'(x) maintains a single sign on the domain; for surjectivity, verify whether the calculated range equals the stated codomain. 4. Recognize standard functional equations: f(x+y) = f(x)f(y) implies f(x) = a^x; f(xy) = f(x) + f(y) implies f(x) = k ln(x); f(x+y) = f(x) + f(y) implies f(x) = kx. 5. Practise counting mappings: Review combinations and binomial coefficients used to count total functions, one-one functions, and onto functions between finite sets.

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Q1 JEE Main 2026 · 8 Apr · Shift 2 MCQ

Consider the relation R on the set $\{-2,-1,0,1,2\}$ defined by $(a,b) \in R$ if and only if $1+ab>0$. Then, among the statements :

I. The number of elements in R is 17

II. R is an equivalence relation

(A) Only I is true
(B) Only II is true
(C) Both I and II are true
(D) Neither I nor II is true

Answer: (A) Only I is true · Official NTA final key

Q2 JEE Main 2026 · 8 Apr · Shift 2 MCQ

A person has three different bags and four different books. The number of ways, in which he can put these books in the bags so that no bag is empty, is :

(A) 18
(B) 36
(C) 39
(D) 72

Answer: (B) 36 · Official NTA final key

Q3 JEE Main 2026 · 8 Apr · Shift 2 Numerical

Let f be a polynomial function such that $\log_2(f(x)) = \left(\log_2\left(2+\frac{2}{3}+\frac{2}{9}+\ldots\infty\right)\right)\cdot\log_3\left(1+\frac{f(x)}{f(1/x)}\right)$, $x>0$ and $f(6)=37$. Then $\sum_{n=1}^{10} f(n)$ is equal to _____.

Numerical value type: the answer is a number.

Answer: 395. · Official NTA final key

Q4 JEE Main 2026 · 6 Apr · Shift 1 MCQ

Let $[\cdot]$ denote the greatest integer function. If the domain of the function $f(x)=\sin^{-1}\left(\frac{x+[x]}{3}\right)$ is $[\alpha,\beta)$, then $\alpha^2+\beta^2$ is equal to:

(A) 2
(B) 5
(C) 10
(D) 13

Answer: (B) 5 · Official NTA final key

Q5 JEE Main 2026 · 6 Apr · Shift 1 MCQ

Let e be the base of natural logarithm and let $f : \{1,2,3,4\} \to \{1, e, e^2, e^3\}$ and $g : \{1, e, e^2, e^3\} \to \left\{1, \frac{1}{2}, \frac{1}{3}, \frac{1}{4}\right\}$ be two bijective functions such that f is strictly decreasing and g is strictly increasing. If $\phi(x) = \left[f^{-1}\left\{g^{-1}\left(\frac{1}{2}\right)\right\}\right]^x$, then the area of the region $\mathrm{R} = \{(x, y) : x^2 \le y \le \phi(x),\ 0 \le x \le 1\}$ is:

(A) $\dfrac{3 - \log_e(2)}{3\log_e(2)}$
(B) $\dfrac{1}{3\log_e(2)}$
(C) $3 + \log_e(2)$
(D) $\dfrac{3 + \log_e(2)}{2 + \log_e(3)}$

Answer: (A) $\dfrac{3 - \log_e(2)}{3\log_e(2)}$ · Official NTA final key

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Q6 JEE Main 2026 · 6 Apr · Shift 2 MCQ

Let $f : \mathbf{R} \to \mathbf{R}$ be defined as $f(x) = \dfrac{2x^2 - 3x + 2}{3x^2 + x + 3}$. Then f is :

(A) both one-one and onto
(B) one-one but not onto
(C) onto but not one-one
(D) neither one-one nor onto

Answer: (D) neither one-one nor onto · Official NTA final key

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Q7 JEE Main 2026 · 6 Apr · Shift 2 Numerical

Let $\mathrm{R} = \{(x, y) \in \mathbf{N} \times \mathbf{N} : \log_e(x + y) \le 2\}$. Then the minimum number of elements, required to be added in R to make it a transitive relation, is _____.

Numerical value type: the answer is a number.

Answer: 15. · Official NTA final key

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Q8 JEE Main 2026 · 5 Apr · Shift 1 MCQ

Let $f:\mathbb{R}\to\mathbb{R}$ be a differentiable function such that $f\left(\frac{x+y}{3}\right)=\frac{f(x)+f(y)}{3}$ for all $x,y\in\mathbb{R}$, and $f'(0)=3$. Then the minimum value of the function $g(x)=3+e^{x}f(x)$, is:

(A) $3\left(\frac{e+1}{e}\right)$
(B) $3\left(\frac{e-1}{e}\right)$
(C) $\frac{3-e}{e}$
(D) $3e$

Answer: (B) $3\left(\frac{e-1}{e}\right)$ · Official NTA final key

Q9 JEE Main 2026 · 5 Apr · Shift 1 Numerical

Let $A=\{1,2,3,4,5,6\}$. The number of one-one functions $f:A\to A$ such that $f(1)\geq 3$, $f(3)\leq 4$ and $f(2)+f(3)=5$, is _____.

Numerical value type: the answer is a number.

Answer: 72. · Official NTA final key

Q10 JEE Main 2026 · 5 Apr · Shift 2 Numerical

Let $A=\{1,4,7\}$ and $B=\{2,3,8\}$. Then the number of elements, in the relation $R=\{((a_1,b_1),(a_2,b_2))\in((A\times B)\times(A\times B)):a_1+b_2 \text{ divides } a_2+b_1\}$ is _____.

Numerical value type: the answer is a number.

Answer: 18. · Official NTA final key

Q11 JEE Main 2026 · 4 Apr · Shift 1 MCQ

Let $[\cdot]$ denote the greatest integer function. If the domain of the function $f(x)=\cos^{-1}\left(\frac{4x+2[x]}{3}\right)$ is $[\alpha,\beta]$, then $12(\alpha+\beta)$ is equal to:

(A) 6
(B) 8
(C) 9
(D) 4

Answer: (A) 6 · Official NTA final key

Q12 JEE Main 2026 · 4 Apr · Shift 1 MCQ

The number of functions $f:\{1,2,3,4\}\to\{a,b,c\}$, which are not onto, is:

(A) 48
(B) 45
(C) 51
(D) 35

Answer: (B) 45 · Official NTA final key

Q13 JEE Main 2026 · 4 Apr · Shift 2 MCQ

For the function $f : [1, \infty) \to [1, \infty)$ defined by $f(x) = (x-1)^4 + 1$, among the two statements:

(I) The set $S = \{x \in [1, \infty) : f(x) = f^{-1}(x)\}$ contains exactly two elements, and

(II) The set $S = \{x \in [1, \infty) : f(x) = f^{-1}(x+1)\}$ is an empty set,

(A) only (I) is TRUE
(B) only (II) is TRUE
(C) both (I) and (II) are TRUE
(D) neither (I) nor (II) is TRUE

Answer: (A) only (I) is TRUE · Official NTA final key

Q14 JEE Main 2026 · 4 Apr · Shift 2 MCQ

Let for some $\alpha \in \mathbb{R}$, $f : \mathbb{R} \to \mathbb{R}$ be a function satisfying $f(x+y) = f(x) + 2y^2 + y + \alpha xy$ for all $x, y \in \mathbb{R}$. If $f(0) = -1$ and $f(1) = 2$, then the value of $\sum_{n=1}^{5} (\alpha + f(n))$ is:

(A) 110
(B) 140
(C) 150
(D) 170

Answer: (B) 140 · Official NTA final key

Q15 JEE Main 2026 · 2 Apr · Shift 1 Numerical

If the domain of the function $f(x) = \sqrt{\log_{(0.6)}\left(\left|\frac{2x-5}{x^2-4}\right|\right)}$ is $(-\infty, \mathrm{a}] \cup \{\mathrm{b}\} \cup [\mathrm{c}, \mathrm{d}) \cup (\mathrm{e}, \infty)$, then the value of $\mathrm{a} + \mathrm{b} + \mathrm{c} + \mathrm{d} + \mathrm{e}$ is _____.

Numerical value type: the answer is a number.

Answer: 4. · Official NTA final key

Q16 JEE Main 2026 · 2 Apr · Shift 2 Numerical

Let $\mathrm{A} = \{2, 3, 4, 5, 6\}$. Let R be a relation on the set $\mathrm{A} \times \mathrm{A}$ given by $(x, y)\mathrm{R}(z, w)$ if and only if x divides z and $y \leq w$. Then the number of elements in R is _____.

Numerical value type: the answer is a number.

Answer: 120. · Official NTA final key

Q17 JEE Main 2026 · 28 Jan · Shift 1 MCQ

If $g(x) = 3x^2 + 2x - 3$, $f(0) = -3$ and $4g(f(x)) = 3x^2 - 32x + 72$, then $f(g(2))$ is equal to:

(A) $-\frac{25}{6}$
(B) $-\frac{7}{2}$
(C) $\frac{25}{6}$
(D) $\frac{7}{2}$

Answer: (D) $\frac{7}{2}$ · Official NTA final key

Q18 JEE Main 2026 · 28 Jan · Shift 2 MCQ

Given below are two statements :

Statement I : The function $f : \mathbf{R} \to \mathbf{R}$ defined by $f(x) = \dfrac{x}{1 + |x|}$ is one-one.

Statement II : The function $f : \mathbf{R} \to \mathbf{R}$ defined by $f(x) = \dfrac{x^2 + 4x - 30}{x^2 - 8x + 18}$ is many-one.

In the light of the above statements, choose the **correct answer** from the options given below :

(A) **Statement I** is true but **Statement II** is false
(B) Both **Statement I** and **Statement II** are true
(C) **Statement I** is false but **Statement II** is true
(D) Both **Statement I** and **Statement II** are false

Answer: (B) Both **Statement I** and **Statement II** are true · Official NTA final key

Q19 JEE Main 2026 · 28 Jan · Shift 2 MCQ

The sum of all the elements in the range of $f(x) = \text{Sgn}(\sin x) + \text{Sgn}(\cos x) + \text{Sgn}(\tan x) + \text{Sgn}(\cot x)$, $x \neq \dfrac{n\pi}{2}$, $n \in \mathbf{Z}$, where $\text{Sgn}(t) = \begin{cases} 1, & \text{if } t > 0 \\ -1, & \text{if } t < 0 \end{cases}$, is :

(A) 0
(B) 2
(C) -2
(D) 4

Answer: (B) 2 · Official NTA final key

Q20 JEE Main 2026 · 24 Jan · Shift 1 MCQ

Let R be a relation defined on the set $\{1, 2, 3, 4\} \times \{1, 2, 3, 4\}$ by

$\mathrm{R} = \{((a, b), (c, d)) : 2a + 3b = 3c + 4d\}$.

Then the number of elements in R is

(A) 18
(B) 12
(C) 6
(D) 15

Answer: (B) 12 · Official NTA final key

Q21 JEE Main 2026 · 24 Jan · Shift 1 MCQ

If the domain of the function

$f(x) = \log_{(10x^2-17x+7)}\left(18x^2 - 11x + 1\right)$

is $(-\infty, a) \cup (b, c) \cup (d, \infty) - \{e\}$, then

$90(a + b + c + d + e)$ equals:

(A) 177
(B) 170
(C) 307
(D) 316

Answer: (D) 316 · Official NTA final key

Q22 JEE Main 2026 · 24 Jan · Shift 2 MCQ

Let f be a function such that $3f(x) + 2f\left(\frac{m}{19x}\right) = 5x$, $x \neq 0$, where $m = \sum_{i=1}^{9}(i)^2$. Then $f(5) - f(2)$ is equal to

(A) 18
(B) 9
(C) -9
(D) 36

Answer: (A) 18 · Official NTA final key

Q23 JEE Main 2026 · 23 Jan · Shift 1 MCQ

Let $\mathrm{A} = \{-2, -1, 0, 1, 2, 3, 4\}$. Let R be a relation on A defined by $x\mathrm{R}y$ if and only if $2x + y \leq 2$. Let l be the number of elements in R. Let m and n be the minimum number of elements required to be added in R to make it reflexive and symmetric relations respectively. Then $l + m + n$ is equal to :

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(A) 34
(B) 35
(C) 32
(D) 33

Answer: (D) 33 · Official NTA final key

Q24 JEE Main 2026 · 23 Jan · Shift 2 MCQ

Let $\mathrm{A} = \{0, 1, 2, \ldots, 9\}$. Let R be a relation on A defined by $(x, y) \in \mathrm{R}$ if and only if $|x - y|$ is a multiple of 3.

Given below are two statements:

Statement I: $n(\mathrm{R}) = 36$.

Statement II: R is an equivalence relation.

In the light of the above statements, choose the **correct** answer from the options given below

(A) Both Statement I and Statement II are correct
(B) Both Statement I and Statement II are incorrect
(C) Statement I is incorrect but Statement II is correct
(D) Statement I is correct but Statement II is incorrect

Answer: (C) Statement I is incorrect but Statement II is correct · Official NTA final key

Q25 JEE Main 2026 · 23 Jan · Shift 2 MCQ

Consider two sets $\mathrm{A} = \{x \in \mathbb{Z} : |(|x - 3| - 3)| \leq 1\}$ and $\mathrm{B} = \left\{x \in \mathbb{R} - \{1, 2\} : \dfrac{(x-2)(x-4)}{x-1} \log_e(|x-2|) = 0\right\}$. Then the number of onto functions $f : \mathrm{A} \to \mathrm{B}$ is equal to

(A) 32
(B) 62
(C) 81
(D) 79

Answer: (B) 62 · Official NTA final key

Q26 JEE Main 2026 · 22 Jan · Shift 1 MCQ

If the domain of the function $f(x) = \sin^{-1}\left(\dfrac{5-x}{3+2x}\right) + \dfrac{1}{\log_e(10-x)}$ is $(-\infty, \alpha] \cup [\beta, \gamma) - \{\delta\}$, then $6(\alpha + \beta + \gamma + \delta)$ is equal to

(A) 68
(B) 66
(C) 70
(D) 67

Answer: (C) 70 · Official NTA final key

Q27 JEE Main 2026 · 22 Jan · Shift 1 MCQ

Let the relation R on the set $\mathrm{M} = \{1, 2, 3, \ldots, 16\}$ be given by $\mathrm{R} = \{(x, y) : 4y = 5x - 3,\ x, y \in \mathrm{M}\}$.

Then the minimum number of elements required to be added in R, in order to make the relation symmetric, is equal to

(A) 3
(B) 4
(C) 2
(D) 1

Answer: (C) 2 · Official NTA final key

Q28 JEE Main 2026 · 22 Jan · Shift 2 MCQ

Let the domain of the function $f(x) = \log_3 \log_5 \left(7 - \log_2(x^2 - 10x + 85)\right) + \sin^{-1}\left(\left|\frac{3x-7}{17-x}\right|\right)$ be $(\alpha, \beta]$. Then $\alpha + \beta$ is equal to :

(A) 9
(B) 12
(C) 8
(D) 10

Answer: (A) 9 · Official NTA final key

Q29 JEE Main 2026 · 22 Jan · Shift 2 MCQ

The number of elements in the relation $\mathrm{R} = \{(x, y) : 4x^2 + y^2 < 52,\ x, y \in \mathbf{Z}\}$ is

(A) 67
(B) 89
(C) 86
(D) 77

Answer: (D) 77 · Official NTA final key

Q30 JEE Main 2026 · 22 Jan · Shift 2 MCQ

Let $f(x) = [x]^2 - [x + 3] - 3$, $x \in \mathbf{R}$, where $[\cdot]$ is the greatest integer funtion. Then

(A) $f(x) > 0$ only for $x \in [4, \infty)$
(B) $f(x) < 0$ only for $x \in [-1, 3)$
(C) $\int_0^2 f(x)\,dx = -6$
(D) $f(x) = 0$ for finitely many values of x

Answer: (B) $f(x) < 0$ only for $x \in [-1, 3)$ · Official NTA final key

Q31 JEE Main 2026 · 22 Jan · Shift 2 MCQ

Let f and g be functions satisfying $f(x+y) = f(x)f(y)$, $f(1) = 7$ and $g(x+y) = g(xy)$, $g(1) = 1$, for all $x, y \in \mathbf{N}$. If $\sum_{x=1}^{n} \left(\frac{f(x)}{g(x)}\right) = 19607$, then n is equal to :

(A) 5
(B) 4
(C) 6
(D) 7

Answer: (A) 5 · Official NTA final key

Q32 JEE Main 2026 · 21 Jan · Shift 1 MCQ

The number of relations, defined on the set $\{a, b, c, d\}$, which are both reflexive and symmetric, is equal to :

(A) 1024
(B) 64
(C) 16
(D) 256

Answer: (B) 64 · Official NTA final key

Q33 JEE Main 2026 · 21 Jan · Shift 1 MCQ

The number of strictly increasing functions f from the set $\{1, 2, 3, 4, 5, 6\}$ to the set $\{1, 2, 3, \ldots, 9\}$ such that $f(i) \neq i$ for $1 \leq i \leq 6$, is equal to :

(A) 22
(B) 27
(C) 21
(D) 28

Answer: (D) 28 · Official NTA final key

Q34 JEE Main 2026 · 21 Jan · Shift 2 MCQ

Let A = $\{2, 3, 5, 7, 9\}$. Let R be the relation on A defined by $x\mathrm{R}y$ if and only if $2x \leq 3y$. Let l be the number of elements in R, and m be the minimum number of elements required to be added in R to

make it a symmetric relation. Then $l + \mathrm{m}$ is equal to :

(A) 23
(B) 21
(C) 25
(D) 27

Answer: (C) 25 · Official NTA final key

Q35 JEE Main 2026 · 21 Jan · Shift 2 MCQ

Let A = $\{x : |x^2 - 10| \leq 6\}$ and B = $\{x : |x - 2| > 1\}$. Then

(A) $\mathrm{A} - \mathrm{B} = [2, 3)$
(B) $\mathrm{A} \cap \mathrm{B} = [-4, -2] \cup [3, 4]$
(C) $\mathrm{B} - \mathrm{A} = (-\infty, -4) \cup (-2, 1) \cup (4, \infty)$
(D) $\mathrm{A} \cup \mathrm{B} = (-\infty, 1] \cup (2, \infty)$

Answer: (C) $\mathrm{B} - \mathrm{A} = (-\infty, -4) \cup (-2, 1) \cup (4, \infty)$ · Official NTA final key

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Q36 JEE Main 2025 · 8 Apr · Shift 2 MCQ

Let $A = \{0, 1, 2, 3, 4, 5\}$. Let R be a relation on A defined by $(x, y) \in R$ if and only if $\max\{x, y\} \in \{3, 4\}$. Then among the statements

(S_1) : The number of elements in R is 18, and

(S_2) : The relation R is symmetric but neither reflexive nor transitive

(A) only (S_1) is true
(B) both are false
(C) only (S_2) is true
(D) both are true

Answer: (C) only (S_2) is true · Key from source paper

Q37 JEE Main 2025 · 8 Apr · Shift 2 Numerical

Let the domain of the function $f(x) = \cos^{-1}\left(\frac{4x+5}{3x-7}\right)$ be $[\alpha, \beta]$ and the domain of $g(x) = \log_2\left(2 - 6\log_{27}(2x + 5)\right)$ be (γ, δ). Then $|7(\alpha + \beta) + 4(\gamma + \delta)|$ is equal to _____.

Numerical value type: the answer is a number.

Answer: 96. · Key from source paper

Q38 JEE Main 2025 · 7 Apr · Shift 1 Numerical

The number of relations on the set A = {1, 2, 3}, containing at most 6 elements including (1, 2), which are reflexive and transitive but not symmetric, is _____ .

Numerical value type: the answer is a number.

Answer: 6. · Checked by our team

Q39 JEE Main 2025 · 7 Apr · Shift 2 MCQ

Let $A = \{(\alpha, \beta) \in \mathbf{R} \times \mathbf{R} : |\alpha - 1| \leqslant 4 \text{ and } |\beta - 5| \leqslant 6\}$ and $B = \{(\alpha, \beta) \in \mathbf{R} \times \mathbf{R} : 16(\alpha - 2)^2 + 9(\beta - 6)^2 \leqslant 144\}$. Then

(A) $A \cup B = \{(x, y) : -4 \leqslant x \leqslant 4, -1 \leqslant y \leqslant 11\}$

(B) $B \subset A$

(C) neither $A \subset B$ nor $B \subset A$

(D) $A \subset B$

Answer: (B) $B \subset A$ · Key from source paper

Q40 JEE Main 2025 · 7 Apr · Shift 2 MCQ

If the range of the function $f(x) = \frac{5-x}{x^2-3x+2}, x \neq 1, 2$, is $(-\infty, \alpha] \cup [\beta, \infty)$, then $\alpha^2 + \beta^2$ is equal to:

(A) 192

(B) 190

(C) 194

(D) 188

Answer: (C) 194 · Key from source paper

Q41 JEE Main 2025 · 4 Apr · Shift 1 MCQ

Let $f, g : (1, \infty) \to \mathbb{R}$ be defined as $f(x) = \frac{2x+3}{5x+2}$ and $g(x) = \frac{2-3x}{1-x}$. If the range of the function fog : $[2, 4] \to \mathbb{R}$ is $[\alpha, \beta]$, then $\frac{1}{\beta-\alpha}$ is equal to

(A) 68

(B) 56

(C) 29

(D) 2

Answer: (B) 56 · Key from source paper

Q42 JEE Main 2025 · 4 Apr · Shift 1 MCQ

Consider the sets $A = \{(x, y) \in \mathbb{R} \times \mathbb{R} : x^2 + y^2 = 25\}$, $B = \{(x, y) \in \mathbb{R} \times \mathbb{R} : x^2 + 9y^2 = 144\}$, $C = \{(x, y) \in \mathbb{Z} \times \mathbb{Z} : x^2 + y^2 \leq 4\}$ and $D = A \cap B$. The total number of one-one functions from the set D to the set C is:

(A) 17160
(B) 15120
(C) 18290
(D) 19320

Answer: (A) 17160 · Key from source paper

Q43 JEE Main 2025 · 4 Apr · Shift 1 MCQ

Let $f:\mathbb{R}\to\mathbb{R}$ be a continuous function satisfying $f(0)=1$ and $f(2x)-f(x)=x$ for all $x\in\mathbb{R}$. If $\lim_{n\to\infty}\left\{f(x)-f\left(\frac{x}{2^n}\right)\right\}=G(x)$, then $\sum_{r=1}^{10}G\left(r^2\right)$ is equal to

(A) 215
(B) 540
(C) 420
(D) 385

Answer: (D) 385 · Key from source paper

Q44 JEE Main 2025 · 4 Apr · Shift 2 MCQ

Let $A=\{-3,-2,-1,0,1,2,3\}$ and R be a relation on A defined by $x\mathrm{R}y$ if and only if $2x-y\in\{0,1\}$. Let l be the number of elements in R. Let m and n be the minimum number of elements required to be added in R to make it reflexive and symmetric relations, respectively. Then $l+\mathrm{m}+\mathrm{n}$ is equal to :

(A) 15
(B) 16
(C) 18
(D) 17

Answer: (D) 17 · Key from source paper

Q45 JEE Main 2025 · 4 Apr · Shift 2 MCQ

Let $f(x)+2f\left(\frac{1}{x}\right)=x^2+5$ and $2g(x)-3g\left(\frac{1}{2}\right)=x, x>0$. If $\alpha=\int_1^2 f(x)\mathrm{d}x$, and $\beta=\int_1^2 g(x)\mathrm{d}x$, then the value of $9\alpha+\beta$ is :

(A) 11
(B) 10
(C) 0
(D) 1

Answer: (A) 11 · Key from source paper

Q46 JEE Main 2025 · 4 Apr · Shift 2 MCQ

Let the domains of the functions $f(x)=\log_4\log_3\log_7\left(8-\log_2\left(x^2+4x+5\right)\right)$ and $g(x)=\sin^{-1}\left(\frac{7x+10}{x-2}\right)$ be (α,β) and $[\gamma,\delta]$, respectively. Then $\alpha^2+\beta^2+\gamma^2+\delta^2$ is equal to :

(A) 13
(B) 14
(C) 16
(D) 15

Answer: (D) 15 · Key from source paper

Q47 JEE Main 2025 · 3 Apr · Shift 1 MCQ

Let $A = \{-3, -2, -1, 0, 1, 2, 3\}$. Let R be a relation on A defined by $x\mathrm{R}y$ if and only if $0 \leq x^2 + 2y \leq 4$. Let l be the number of elements in R and m be the minimum number of elements required to be added in R to make it a reflexive relation. Then $l + m$ is equal to

(A) 17
(B) 18
(C) 20
(D) 19

Answer: (B) 18 · Key from source paper

Q48 JEE Main 2025 · 3 Apr · Shift 1 MCQ

If the domain of the function $f(x) = \log_e\left(\frac{2x-3}{5+4x}\right) + \sin^{-1}\left(\frac{4+3x}{2-x}\right)$ is $[\alpha, \beta)$, then $\alpha^2 + 4\beta$ is equal to

(A) 3
(B) 7
(C) 5
(D) 4

Answer: (D) 4 · Key from source paper

Q49 JEE Main 2025 · 3 Apr · Shift 2 MCQ

Let f be a function such that $f(x) + 3f\left(\frac{24}{x}\right) = 4x, x \neq 0$. Then $f(3) + f(8)$ is equal to :

(A) 13
(B) 12
(C) 10
(D) 11

Answer: (D) 11 · Key from source paper

Q50 JEE Main 2025 · 3 Apr · Shift 2 MCQ

If the domain of the function $f(x) = \log_7\left(1 - \log_4\left(x^2 - 9x + 18\right)\right)$ is $(\alpha, \beta) \cup (\gamma, \delta)$, then $\alpha + \beta + \gamma + \delta$ is equal to

(A) 17
(B) 16
(C) 15
(D) 18

Answer: (D) 18 · Key from source paper

Q51 JEE Main 2025 · 3 Apr · Shift 2 MCQ

Let $A = \{-2, -1, 0, 1, 2, 3\}$. Let R be a relation on A defined by $x\mathrm{R}y$ if and only if $y = \max\{x, 1\}$. Let l be the number of elements in R. Let m and n be the minimum number of elements required to be added in $\mathbf{R}$ to make it reflexive and symmetric relations, respectively. Then $l + m + n$ is equal to

(A) 12
(B) 14
(C) 11
(D) 13

Answer: (A) 12 · Key from source paper

Q52 JEE Main 2025 · 2 Apr · Shift 1 MCQ

Let A be the set of all functions $f : Z \to Z$ and R be a relation on A such that $R = \{(f, g) : f(0) = g(1)$ and $f(1) = g(0)\}$. Then R is :

(A) Transitive but neither reflexive nor symmetric
(B) Symmetric and transitive but not reflective
(C) Symmetric but neither reflective nor transitive
(D) Reflexive but neither symmetric nor transitive

Answer: (C) Symmetric but neither reflective nor transitive · Key from source paper

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Q53 JEE Main 2025 · 2 Apr · Shift 1 MCQ

Let $f : R \to R$ be a twice differentiable function such that

$(\sin x \cos y)(f(2x + 2y) - f(2x - 2y)) = (\cos x \sin y)(f(2x + 2y) + f(2x - 2y))$, for all $x, y \in R$.

If $f'(0) = \frac{1}{2}$, then the value of $24f''\left(\frac{5\pi}{3}\right)$ is :

(A) -2
(B) 2
(C) 3
(D) -3

Answer: (D) -3 · Key from source paper

Q54 JEE Main 2025 · 2 Apr · Shift 2 MCQ

If the domain of the function $f(x)=\frac{1}{\sqrt{10+3x-x^2}}+\frac{1}{\sqrt{x+|x|}}$ is (a,b), then $(1+a)^2+b^2$ is equal to :

(A) 30
(B) 26
(C) 29
(D) 25

Answer: (B) 26 · Key from source paper

Q55 JEE Main 2025 · 2 Apr · Shift 2 MCQ

Let $A=\{1,2,3,\ldots,100\}$ and R be a relation on A such that $R=\{(a,b):a=2b+1\}$. Let $(a_1,a_2),(a_2,a_3),(a_3,a_4),\ldots,(a_k,a_{k+1})$ be a sequence of k elements of R such that the second entry of an ordered pair is equal to the first entry of the next ordered pair. Then the largest integer k, for which such a sequence exists, is equal to :

(A) 6
(B) 7
(C) 5
(D) 8

Answer: (C) 5 · Key from source paper

Q56 JEE Main 2025 · 29 Jan · Shift 1 MCQ

Define a relation R on the interval $\left[0,\frac{\pi}{2}\right)$ by $x\mathrm{R}y$ if and only if $\sec^2 x-\tan^2 y=1$. Then R is :

(A) both reflexive and transitive but not symmetric
(B) an equivalence relation
(C) reflexive but neither symmetric not transitive
(D) both reflexive and symmetric but not transitive

Answer: (B) an equivalence relation · Key from source paper

Q57 JEE Main 2025 · 29 Jan · Shift 2 MCQ

If the domain of the function $\log_5\left(18x-x^2-77\right)$ is (α,β) and the domain of the function $\log_{(x-1)}\left(\frac{2x^2+3x-2}{x^2-3x-4}\right)$ is (γ,δ), then $\alpha^2+\beta^2+\gamma^2$ is equal to :

(A) 195
(B) 179
(C) 186
(D) 174

Answer: (C) 186 · Key from source paper

Q58 JEE Main 2025 · 29 Jan · Shift 2 MCQ

Let $S = \mathbf{N} \cup \{0\}$. Define a relation R from S to $\mathbf{R}$ by : $\mathrm{R} = \left\{(x, y) : \log_e y = x \log_e \left(\frac{2}{5}\right), x \in S, y \in \mathbf{R}\right\}$ Then, the sum of all the elements in the range of R is equal to :

(A) $\frac{10}{9}$
(B) $\frac{3}{2}$
(C) $\frac{5}{2}$
(D) $\frac{5}{3}$

Answer: (D) $\frac{5}{3}$ · Key from source paper

Q59 JEE Main 2025 · 28 Jan · Shift 1 MCQ

Let $f : \mathbb{R} \to \mathbb{R}$ be a function defined by $f(x) = (2 + 3a)x^2 + \left(\frac{a+2}{a-1}\right)x + b, a \neq 1$. If $f(x + y) = f(x) + f(y) + 1 - \frac{2}{7}xy$, then the value of $28 \sum_{i=1}^{5} |f(i)|$ is

(A) 545
(B) 715
(C) 735
(D) 675

Answer: (D) 675 · Key from source paper

Q60 JEE Main 2025 · 28 Jan · Shift 1 MCQ

If $f(x) = \frac{2^x}{2^x + \sqrt{2}}$, $x \in \mathbb{R}$, then $\sum_{k=1}^{81} f\left(\frac{k}{82}\right)$ is equal to

(A) $1.81\sqrt{2}$
(B) 41
(C) 82
(D) $\frac{81}{2}$

Answer: (D) $\frac{81}{2}$ · Key from source paper

Q61 JEE Main 2025 · 28 Jan · Shift 1 MCQ

The relation $R = \{(x, y) : x, y \in \mathbb{Z}$ and $x + y$ is even $\}$ is:

(A) reflexive and symmetric but not transitive
(B) an equivalence relation
(C) symmetric and transitive but not reflexive
(D) reflexive and transitive but not symmetric

Answer: (B) an equivalence relation · Key from source paper

EdLoop JEE

Q62 JEE Main 2025 · 28 Jan · Shift 2 MCQ

Let $f : [0, 3] \to \mathrm{A}$ be defined by $f(x) = 2x^3 - 15x^2 + 36x + 7$ and $g : [0, \infty) \to B$ be defined by $g(x) = \frac{x^{2025}}{x^{2025}+1}$. If both the functions are onto and $\mathrm{S} = \{x \in \mathbf{Z} : x \in \mathrm{A} \text{ or } x \in \mathrm{B}\}$, then n(S) is equal to :

(A) 29
(B) 30
(C) 31
(D) 36

Answer: (B) 30 · Key from source paper

Q63 JEE Main 2025 · 28 Jan · Shift 2 MCQ

Let $f : \mathbf{R} - \{0\} \to (-\infty, 1)$ be a polynomial of degree 2, satisfying $f(x)f\left(\frac{1}{x}\right) = f(x) + f\left(\frac{1}{x}\right)$. If $f(K) = -2K$, then the sum of squares of all possible values of K is :

(A) 7
(B) 6
(C) 1
(D) 9

Answer: (B) 6 · Key from source paper

Q64 JEE Main 2025 · 24 Jan · Shift 1 MCQ

Let $f : R - \{0\} \to R$ be a function such that $f(x) - 6f\left(\frac{1}{x}\right) = \frac{35}{3x} - \frac{5}{2}$. If the $\lim_{x\to 0}\left(\frac{1}{\alpha x} + f(x)\right) = \beta$; $\alpha, \beta \in R$, then $\alpha + 2\beta$ is equal to

(A) 5
(B) 3
(C) 4
(D) 6

Answer: (C) 4 · Key from source paper

Q65 JEE Main 2025 · 24 Jan · Shift 1 MCQ

Let $f(x) = \frac{2^{x+2}+16}{2^{2x+1}+2^{x+4}+32}$. Then the value of $8\left(f\left(\frac{1}{15}\right) + f\left(\frac{2}{15}\right) + \ldots + f\left(\frac{59}{15}\right)\right)$ is equal to

(A) 92
(B) 118
(C) 102
(D) 108

Answer: (B) 118 · Key from source paper

Q66 JEE Main 2025 · 24 Jan · Shift 2 MCQ

The function $f:(-\infty,\infty)\to(-\infty,1)$, defined by $f(x)=\frac{2^x-2^{-x}}{2^x+2^{-x}}$ is :

(A) Neither one-one nor onto
(B) Onto but not one-one
(C) Both one-one and onto
(D) One-one but not onto

Answer: (D) One-one but not onto · Key from source paper

Q67 JEE Main 2025 · 24 Jan · Shift 2 Numerical

Number of functions $f:\{1,2,\ldots,100\}\to\{0,1\}$, that assign 1 to exactly one of the positive integers less than or equal to 98 , is equal to _____ .

Numerical value type: the answer is a number.

Answer: 392. · Key from source paper

Q68 JEE Main 2025 · 23 Jan · Shift 1 MCQ

Let $f(x)=\log_e x$ and $g(x)=\frac{x^4-2x^3+3x^2-2x+2}{2x^2-2x+1}$. Then the domain of $f\circ g$ is

(A) $[0,\infty)$
(B) $[1,\infty)$
(C) $(0,\infty)$
(D) $\mathbb{R}$

Answer: (D) $\mathbb{R}$ · Key from source paper

Q69 JEE Main 2025 · 23 Jan · Shift 1 MCQ

Let $\mathrm{R}=\{(1,2),(2,3),(3,3)\}$ be a relation defined on the set $\{1,2,3,4\}$. Then the minimum number of elements, needed to be added in R so that R becomes an equivalence relation, is:

(A) 10
(B) 7
(C) 8
(D) 9

Answer: (B) 7 · Key from source paper

Q70 JEE Main 2025 · 23 Jan · Shift 2 MCQ

Let $\mathrm{A}=\{(x,y)\in\mathbf{R}\times\mathbf{R}:|x+y|\geqslant 3\}$ and $\mathrm{B}=\{(x,y)\in\mathbf{R}\times\mathbf{R}:|x|+|y|\leq 3\}$. If $\mathrm{C}=\{(x,y)\in\mathrm{A}\cap\mathrm{B}:x=0 \text{ or } y=0\}$, then $\sum_{(x,y)\in\mathrm{C}}|x+y|$ is :

(A) 15
(B) 24
(C) 18
(D) 12

Answer: (D) 12 · Key from source paper

Q71 JEE Main 2025 · 23 Jan · Shift 2 MCQ

Let $X = \mathbf{R} \times \mathbf{R}$. Define a relation R on X as : $(a_1, b_1)R(a_2, b_2) \Leftrightarrow b_1 = b_2$ Statement I : R is an equivalence relation. Statement II : For some $(a, b) \in X$, the set $S = \{(x, y) \in X : (x, y)R(a, b)\}$ represents a line parallel to $y = x$. In the light of the above statements, choose the correct answer from the options given below :

(A) Both Statement I and Statement II are false
(B) Statement I is true but Statement II is false
(C) Both Statement I and Statement II are true
(D) Statement I is false but Statement II is true

Answer: (B) Statement I is true but Statement II is false · Key from source paper

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Q72 JEE Main 2025 · 22 Jan · Shift 1 MCQ

Let $f(x)$ be a real differentiable function such that $f(0) = 1$ and $f(x + y) = f(x)f'(y) + f'(x)f(y)$ for all $x, y \in \mathbf{R}$. Then $\sum_{n=1}^{100} \log_e f(\mathrm{n})$ is equal to :

(A) 2525
(B) 5220
(C) 2384
(D) 2406

Answer: (A) 2525 · Key from source paper

Q73 JEE Main 2025 · 22 Jan · Shift 1 MCQ

The number of non-empty equivalence relations on the set $\{1, 2, 3\}$ is :

(A) 6
(B) 5
(C) 7
(D) 4

Answer: (B) 5 · Key from source paper

Q74 JEE Main 2025 · 22 Jan · Shift 2 MCQ

Let $\mathrm{A} = \{1, 2, 3, 4\}$ and $\mathrm{B} = \{1, 4, 9, 16\}$. Then the number of many-one functions $f : \mathrm{A} \to \mathrm{B}$ such that $1 \in f(\mathrm{A})$ is equal to :

(A) 151
(B) 139
(C) 163
(D) 127

Answer: (A) 151 · Key from source paper

Q75 JEE Main 2025 · 22 Jan · Shift 2 Numerical

Let $A = \{1, 2, 3\}$. The number of relations on A, containing $(1, 2)$ and $(2, 3)$, which are reflexive and transitive but not symmetric, is _____ .

Numerical value type: the answer is a number.

Answer: 3. · Key from source paper

Q76 JEE Main 2024 · 9 Apr · Shift 1 MCQ

If the domain of the function $f(x) = \sin^{-1}\left(\frac{x-1}{2x+3}\right)$ is $\mathbf{R} - (\alpha, \beta)$, then $12\alpha\beta$ is equal to :

(A) 32
(B) 40
(C) 24
(D) 36

Answer: (A) 32 · Key from source paper

Q77 JEE Main 2024 · 9 Apr · Shift 1 Numerical

Let $A = \{2, 3, 6, 7\}$ and $B = \{4, 5, 6, 8\}$. Let R be a relation defined on $A \times B$ by $(a_1, b_1)R(a_2, b_2)$ if and only if $a_1 + a_2 = b_1 + b_2$. Then the number of elements in R is _____

Numerical value type: the answer is a number.

Answer: 25. · Key from source paper

Q78 JEE Main 2024 · 9 Apr · Shift 1 Numerical

If a function f satisfies $f(\mathrm{m} + \mathrm{n}) = f(\mathrm{m}) + f(\mathrm{n})$ for all $\mathrm{m}, \mathrm{n} \in \mathbf{N}$ and $f(1) = 1$, then the largest natural number λ such that $\sum_{k=1}^{2022} f(\lambda + k) \leq (2022)^2$ is equal to _____

Numerical value type: the answer is a number.

Answer: 1010. · Key from source paper

Q79 JEE Main 2024 · 9 Apr · Shift 2 Numerical

Let $A = \{(x, y) : 2x + 3y = 23, x, y \in \mathbb{N}\}$ and $B = \{x : (x, y) \in A\}$. Then the number of one-one functions from A to B is equal to _____

Numerical value type: the answer is a number.

Answer: 24. · Key from source paper

Q80 JEE Main 2024 · 8 Apr · Shift 1 MCQ

Let $[t]$ be the greatest integer less than or equal to t. Let A be the set of all prime factors of 2310 and $f : A \to \mathbb{Z}$ be the function $f(x) = \left[\log_2\left(x^2 + \left[\frac{x^3}{5}\right]\right)\right]$. The number of one-to-one functions from A to the range of f is

(A) 25
(B) 24
(C) 20
(D) 120

Answer: (D) 120 · Key from source paper

Q81 JEE Main 2024 · 8 Apr · Shift 2 MCQ

Let $A = \{2, 3, 6, 8, 9, 11\}$ and $B = \{1, 4, 5, 10, 15\}$. Let R be a relation on $A \times B$ defined by $(a, b)R(c, d)$ if and only if $3ad - 7bc$ is an even integer. Then the relation R is

(A) an equivalence relation.
(B) reflexive and symmetric but not transitive.
(C) transitive but not symmetric.
(D) reflexive but not symmetric.

Answer: (B) reflexive and symmetric but not transitive. · Key from source paper

Q82 JEE Main 2024 · 8 Apr · Shift 2 MCQ

Let $f(x) = \begin{cases} -\mathrm{a} & \text{if } -\mathrm{a} \le x \le 0 \\ x + \mathrm{a} & \text{if } 0 < x \le \mathrm{a} \end{cases}$ where $\mathrm{a} > 0$ and $g(x) = (f(|x|) - |f(x)|)/2$. Then the function $g : [-a, a] \to [-a, a]$ is

(A) neither one-one nor onto.
(B) onto.
(C) both one-one and onto.
(D) one-one.

Answer: (A) neither one-one nor onto. · Key from source paper

Q83 JEE Main 2024 · 6 Apr · Shift 1 MCQ

Let $A = \{n \in [100, 700] \cap \mathbb{N} : n$ is neither a multiple of 3 nor a multiple of 4$\}$. Then the number of elements in A is

(A) 290
(B) 280
(C) 300
(D) 310

Answer: (C) 300 · Key from source paper

Q84 JEE Main 2024 · 6 Apr · Shift 1 MCQ

Let the relations R_1 and R_2 on the set $X = \{1, 2, 3, \ldots, 20\}$ be given by $R_1 = \{(x, y) : 2x - 3y = 2\}$ and $R_2 = \{(x, y) : -5x + 4y = 0\}$. If M and N be the minimum number of elements required to be added in R_1 and R_2, respectively, in order to make the relations symmetric, then $M + N$ equals

(A) 12
(B) 16
(C) 8
(D) 10

Answer: (D) 10 · Key from source paper

Q85 JEE Main 2024 · 6 Apr · Shift 1 MCQ

The function f: R->R, $f(x) = \frac{x^2+2x-15}{x^2-4x+9}$, $x \in \mathbb{R}$ is

(A) one-one but not onto.
(B) both one-one and onto.
(C) onto but not one-one.
(D) neither one-one nor onto.

Answer: (D) neither one-one nor onto. · Key from source paper

Q86 JEE Main 2024 · 6 Apr · Shift 2 MCQ

Let $A = \{1, 2, 3, 4, 5\}$. Let R be a relation on A defined by xRy if and only if $4x \leq 5y$. Let m be the number of elements in R and n be the minimum number of elements from $A \times A$ that are required to be added to R to make it a symmetric relation. Then m + n is equal to :

(A) 25
(B) 24
(C) 26
(D) 23

Answer: (A) 25 · Key from source paper

Q87 JEE Main 2024 · 6 Apr · Shift 2 MCQ

Let $f(x) = \frac{1}{7-\sin 5x}$ be a function defined on $\mathbf{R}$. Then the range of the function $f(x)$ is equal to ;

(A) $[\frac{1}{7}, \frac{1}{6}]$
(B) $[\frac{1}{8}, \frac{1}{5}]$
(C) $[\frac{1}{7}, \frac{1}{5}]$
(D) $[\frac{1}{8}, \frac{1}{6}]$

Answer: (D) $[\frac{1}{8}, \frac{1}{6}]$ · Key from source paper

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Q88 JEE Main 2024 · 5 Apr · Shift 1 MCQ

Let $A = \{1, 3, 7, 9, 11\}$ and $B = \{2, 4, 5, 7, 8, 10, 12\}$. Then the total number of one-one maps $f : A \to B$, such that $f(1) + f(3) = 14$, is :

(A) 480
(B) 240
(C) 120
(D) 180

Answer: (B) 240 · Key from source paper

Q89 JEE Main 2024 · 5 Apr · Shift 1 Numerical

If $S = \{a \in \mathbf{R} : |2a - 1| = 3[a] + 2\{a\}\}$, where $[t]$ denotes the greatest integer less than or equal to t and $\{t\}$ represents the fractional part of t, then $72 \sum_{a \in S} a$ is equal to _____

Numerical value type: the answer is a number.

Answer: 18. · Key from source paper

Q90 JEE Main 2024 · 5 Apr · Shift 2 MCQ

Let $f, g : \mathbf{R} \to \mathbf{R}$ be defined as : $f(x) = |x - 1|$ and $g(x) = \begin{cases} e^x, \text{ MARA} & x \geq 0 \\ x + 1, & x \leq 0 \end{cases}$ Then the function $f(g(x))$ is

(A) neither one-one nor onto.
(B) one-one but not onto.
(C) onto but not one-one.
(D) both one-one and onto.

Answer: (A) neither one-one nor onto. · Key from source paper

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Q91 JEE Main 2024 · 4 Apr · Shift 1 MCQ

If the domain of the function $\sin^{-1}\left(\frac{3x-22}{2x-19}\right) + \log_e\left(\frac{3x^2-8x+5}{x^2-3x-10}\right)$ is $(\alpha, \beta]$, then $3\alpha + 10\beta$ is equal to:

(A) 100
(B) 95
(C) 97
(D) 98

Answer: (C) 97 · Key from source paper

Q92 JEE Main 2024 · 4 Apr · Shift 1 MCQ

Let the sum of the maximum and the minimum values of the function $f(x) = \frac{2x^2-3x+8}{2x^2+3x+8}$ be $\frac{m}{n}$, where $\mathrm{gcd}(\mathrm{m}, \mathrm{n}) = 1$. Then $\mathrm{m} + \mathrm{n}$ is equal to :

(A) 195
(B) 201
(C) 217
(D) 182

Answer: (B) 201 · Key from source paper

Q93 JEE Main 2024 · 4 Apr · Shift 1 Numerical

In a survey of 220 students of a higher secondary school, it was found that at least 125 and at most 130 students studied Mathematics; at least 85 and at most 95 studied Physics; at least 75 and at most 90 studied Chemistry; 30 studied both Physics and Chemistry; 50 studied both Chemistry and Mathematics; 40 studied both Mathematics and Physics and 10 studied none of these subjects. Let m and n respectively be the least and the most number of students who studied all the three subjects. Then m + n is equal to _____

Numerical value type: the answer is a number.

Answer: 45. · Key from source paper

Q94 JEE Main 2024 · 4 Apr · Shift 2 MCQ

Let a relation R on $\mathbb{N} \times N$ be defined as: $(x_1, y_1)\mathrm{R}\,(x_2, y_2)$ if and only if $x_1 \leq x_2$ or $y_1 \leq y_2$. Consider the two statements: (I) R is reflexive but not symmetric. (II) R is transitive Then which one of the following is true?

(A) Both (I) and (II) are correct.
(B) Only (II) is correct.
(C) Neither (I) nor (II) is correct.
(D) Only (I) is correct.

Answer: (D) Only (I) is correct. · Key from source paper

Q95 JEE Main 2024 · 4 Apr · Shift 2 MCQ

Let $f(x)=3\sqrt{x-2}+\sqrt{4-x}$ be a real valued function. If α and β are respectively the minimum and the maximum values of f, then $\alpha^2+2\beta^2$ is equal to

(A) 42
(B) 38
(C) 24
(D) 44

Answer: (A) 42 · Key from source paper

Q96 JEE Main 2024 · 4 Apr · Shift 2 Numerical

Consider the function $f:\mathbb{R}\to\mathbb{R}$ defined by $f(x)=\frac{2x}{\sqrt{1+9x^2}}$. If the composition of $f,\underbrace{(f\circ f\circ f\circ\cdots\circ f)}_{10\text{ times}}(x)=\frac{2^{10}x}{\sqrt{1+9\alpha x^2}}$, then the value of $\sqrt{3\alpha+1}$ is equal to _____

Numerical value type: the answer is a number.

Answer: 1024. · Key from source paper

Q97 JEE Main 2024 · 1 Feb · Shift 1 MCQ

Let $f:R\to R$ and $g:R\to R$ be defined as $fx=\begin{cases}\log_e x, & x>0\\ e^{-x}, & x\le 0\end{cases}$ and $gx=\begin{cases}x, & x\ge 0\\ e^{x}, & x<0\end{cases}$. Then, $gof:R\to R$ is:

(A) one-one but not onto
(B) neither one-one nor onto
(C) onto but not one-one
(D) both one-one and onto

Answer: (B) neither one-one nor onto · Key from source paper

Q98 JEE Main 2024 · 1 Feb · Shift 1 Numerical

Let $A=1,2,3,....20$. Let R_1 and R_2 two relation on A such that

$R_1=\{a,b:b \text{ is divisible by } a\}$

$R_2=\{a,b:a \text{ is an integral multiple of } b\}$

Then, number of elements in R_1-R_2 is equal to _____ .

Numerical value type: the answer is a number.

Answer: 46. · Key from source paper

Q99 JEE Main 2024 · 1 Feb · Shift 2 MCQ

Consider the relations R_1 and R_2 defined as $aR_1b \Leftrightarrow a^2 + b^2 = 1$ for all $a, b, \in R$ and $a, bR_2c, d \Leftrightarrow a + d = b + c$ for all $a, b, c, d \in N \times N$. Then

(A) Only R_1 is an equivalence relation
(B) Only R_2 is an equivalence relation
(C) R_1 and R_2 both are equivalence relation
(D) Neither R_1 nor R_2 is an equivalence relation

Answer: (B) Only R_2 is an equivalence relation · Key from source paper

Q100 JEE Main 2024 · 1 Feb · Shift 2 MCQ

If the domain of the function $fx = \frac{\sqrt{x^2-25}}{4-x^2} + \log_{10} x^2 + 2x - 15$ is $-\infty, \alpha \cup \beta, \infty$, then $\alpha^2 + \beta^3$ is equal to:

(A) 140
(B) 175
(C) 150
(D) 125

Answer: (C) 150 · Key from source paper

Q101 JEE Main 2024 · 31 Jan · Shift 1 MCQ

If $f(x) = \frac{4x+3}{6x-4}$, $x \neq \frac{2}{3}$ and $(f \circ f)(x) = g(x)$, where $g : R - \frac{2}{3} \to R - \frac{2}{3}$, then $(g \circ g \circ g)(4)$ is equal to

(A) $-\frac{19}{20}$
(B) $\frac{19}{20}$
(C) -4
(D) 4

Answer: (D) 4 · Key from source paper

Q102 JEE Main 2024 · 31 Jan · Shift 1 Numerical

Let $A = \{1, 2, 3, 4\}$ and $R = \{(1, 2), (2, 3), (1, 4)\}$ be a relation on A. Let S be the equivalence relation on A such that $R \subset S$ and the number of elements in S is n. Then, the minimum value of n is _____.

Numerical value type: the answer is a number.

Answer: 16. · Key from source paper

Q103 JEE Main 2024 · 31 Jan · Shift 2 MCQ

If the function $f : -\infty, -1 \to a, b$ defined by $f(x) = e^{x^3-3x+1}$ is one-one and onto, then the distance of the point $P(2b + 4, a + 2)$ from the line $x + e^{-3}y = 4$ is:

(A) $2\sqrt{1+e^6}$
(B) $4\sqrt{1+e^6}$
(C) $3\sqrt{1+e^6}$
(D) $\sqrt{1+e^6}$

Answer: (A) $2\sqrt{1+e^6}$ · Key from source paper

Q104 JEE Main 2024 · 31 Jan · Shift 2 Numerical

Let $A = \{1, 2, 3, \ldots, 100\}$. Let R be a relation on A defined by $(x, y) \in R$ if and only if $2x = 3y$. Let R_1 be a symmetric relation on A such that $R \subset R_1$ and the number of elements in R_1 is n. Then the minimum value of n is _____.

Numerical value type: the answer is a number.

Answer: 66. · Key from source paper

Q105 JEE Main 2024 · 30 Jan · Shift 1 MCQ

If the domain of the function $f(x) = \cos^{-1}\left(\frac{2-|x|}{4}\right) + (\log_e(3-x))^{-1}$ is $[-\alpha, \beta) - \{\gamma\}$, then $\alpha + \beta + \gamma$ is equal to :

(A) 12
(B) 9
(C) 11
(D) 8

Answer: (C) 11 · Key from source paper

Q106 JEE Main 2024 · 30 Jan · Shift 1 Numerical

A group of 40 students appeared in an examination of 3 subjects - Mathematics, Physics & Chemistry. It was found that all students passed in at least one of the subjects, 20 students passed in Mathematics, 25 students passed in Physics, 16 students passed in Chemistry, at most 11 students passed in both Mathematics and Physics, at most 15 students passed in both Physics and Chemistry, at most 15 students passed in both Mathematics and Chemistry. The maximum number of students passed in all the three subjects is _____.

Numerical value type: the answer is a number.

Answer: 10. · Key from source paper

Q107 JEE Main 2024 · 30 Jan · Shift 1 Numerical

Let $A = \{1, 2, 3, \ldots\ldots 7\}$ and let $P(A)$ denote the power set of A. If the number of functions $f : A \to P(A)$ such that $a \in f(a), \forall a \in A$ is m^n, m and $n \in N$ and m is least, then $m + n$ is equal to _____.

Numerical value type: the answer is a number.

Answer: 44. · Key from source paper

Q108 JEE Main 2024 · 30 Jan · Shift 2 MCQ

If the domain of the function $f(x)=\log_e \frac{2x+3}{4x^2+x-3}+\cos^{-1}\frac{2x-1}{x+2}$ is $(\alpha,\beta]$, then the value of $5\beta-4\alpha$ is equal to

(A) 10
(B) 12
(C) 11
(D) 9

Answer: (B) 12 · Key from source paper

Q109 JEE Main 2024 · 30 Jan · Shift 2 MCQ

Let $f: R-\{0\}\to R$ be a function satisfying $f\left(\frac{x}{y}\right)=\frac{f(x)}{f(y)}$ for all $x, y, f(y)\neq 0$. If $f'(1)=2024$, then

(A) $xf'(x)-2024f(x)=0$
(B) $xf'(x)+2024f(x)=0$
(C) $x'(x)+f(x)=2024$
(D) $xf'(x)-2023f(x)=0$

Answer: (A) $xf'(x)-2024f(x)=0$ · Key from source paper

Q110 JEE Main 2024 · 30 Jan · Shift 2 Numerical

The number of symmetric relations defined on the set $\{1,2,3,4\}$ which are not reflexive is _____.

Numerical value type: the answer is a number.

Answer: 960. · Key from source paper

Q111 JEE Main 2024 · 29 Jan · Shift 1 MCQ

Let R be a relation on $Z\times Z$ defined by $(a,\ b)R(c,\ d)$ if and only if $ad-bc$ is divisible by 5. Then R is

(A) Reflexive and symmetric but not transitive
(B) Reflexive but neither symmetric not transitive
(C) Reflexive, symmetric and transitive
(D) Reflexive and transitive but not symmetric

Answer: (A) Reflexive and symmetric but not transitive · Key from source paper

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Q112 JEE Main 2024 · 29 Jan · Shift 1 MCQ

If $f(x)=\begin{cases}2+2x, & -1\le x<0\\ 1-\frac{x}{3}, & 0\le x\le 3\end{cases}$; $g(x)=\begin{cases}-x, & -3\le x\le 0\\ x, & 0<x\le 1\end{cases}$, then range of $(f\circ g(x))$ is

(A) $(0, 1]$
(B) $[0, 3)$
(C) $[0, 1]$
(D) $[0, 1)$

Answer: (C) $[0, 1]$ · Key from source paper

Q113 JEE Main 2024 · 29 Jan · Shift 2 MCQ

If R is the smallest equivalence relation on the set $\{1, 2, 3, 4\}$ such that $\{(1, 2), (1, 3)\} \subset R$, then the number of elements in R is _____.

(A) 10
(B) 12
(C) 8
(D) 15

Answer: (A) 10 · Key from source paper

Q114 JEE Main 2024 · 27 Jan · Shift 1 MCQ

Let $S = \{1, 2, 3, \ldots, 10\}$. Suppose M is the set of all the subsets of S, then the relation $R = \{(A, B) : A \cap B \neq \phi;\ A, B \in M\}$ is :

(A) symmetric and reflexive only
(B) reflexive only
(C) symmetric and transitive only
(D) symmetric only

Answer: (D) symmetric only · Key from source paper

Q115 JEE Main 2024 · 27 Jan · Shift 1 MCQ

The function f : N $-$ {1} $\to$ N; defined by $f(n)$ = the highest prime factor of n, is :

(A) both one-one and onto
(B) one-one only
(C) onto only
(D) neither one-one nor onto

Answer: (D) neither one-one nor onto · Key from source paper

Q116 JEE Main 2024 · 27 Jan · Shift 1 Numerical

Let for a differentiable function $f : (0, \infty) \to R$, $f(x) - f(y) \geq \log_e \left(\frac{x}{y}\right) + x - y$, $\forall x, y \in (0, \infty)$. Then $\sum_{n=1}^{20} f'\left(\frac{1}{n^2}\right)$ is equal to

Numerical value type: the answer is a number.

Answer: 2890. · Key from source paper

Q117 JEE Main 2024 · 27 Jan · Shift 2 MCQ

Let A and B be two finite sets with m and n elements respectively. The total number of subsets of the set A is 56 more than the total number of subsets of B. Then the distance of the point $P(m, n)$ from the point $Q(-2, -3)$ is

(A) 10
(B) 6
(C) 4
(D) 8

Answer: (A) 10 · Key from source paper

Q118 JEE Main 2024 · 27 Jan · Shift 2 MCQ

Let f: $R - \frac{-1}{2} \to R$ and g: $R - \frac{-5}{2} \to R$ be defined as $fx = \frac{2x+3}{2x+1}$ and $gx = \frac{|x|+1}{2x+5}$. Then the domain of the function fog is :

(A) $R - -\frac{5}{2}$
(B) R
(C) $R - -\frac{7}{4}$
(D) $R - -\frac{5}{2}, -\frac{7}{4}$

Answer: (A) $R - -\frac{5}{2}$ · Key from source paper

Q119 JEE Main 2023 · 15 Apr · Shift 1 MCQ

If the domain of the function $f(x) = \log_e\left(4x^2 + 11x + 6\right) + \sin^{-1}(4x + 3) + \cos^{-1}\left(\frac{10x+6}{3}\right)$ is $(\alpha, \beta]$, then $36|\alpha + \beta|$ is equal to

(A) 54
(B) 72
(C) 63
(D) 45

Answer: (D) 45 · Key from source paper

Q120 JEE Main 2023 · 15 Apr · Shift 1 Numerical

Let $A = \{1, 2, 3, 4\}$ and R be a relation on the set $A \times A$ defined by $R = \{((a, b), (c, d)) : 2a + 3b = 4c + 5d\}$. Then the number of elements in R is _____.

Numerical value type: the answer is a number.

Answer: 6. · Key from source paper

EdLoop JEE

Q121 JEE Main 2023 · 13 Apr · Shift 1 MCQ

For $x \in \mathbb{R}$, two real valued functions $f(x)$ and $g(x)$ are such that, $g(x) = \sqrt{x} + 1$ and $fog(x) = x + 3 - \sqrt{x}$. Then $f(0)$ is equal to

(A) 1
(B) 5
(C) 0
(D) -3

Answer: (B) 5 · Key from source paper

Q122 JEE Main 2023 · 13 Apr · Shift 1 MCQ

For the differentiable function $f : \mathbb{R} - \{0\} \to \mathbb{R}$, let $3f(x) + 2f\left(\frac{1}{x}\right) = \frac{1}{x} - 10$, then $\left|f(3) + f'\left(\frac{1}{4}\right)\right|$ is equal to

(A) $\frac{33}{5}$
(B) 8
(C) $\frac{29}{5}$
(D) 13

Answer: (D) 13 · Key from source paper

Q123 JEE Main 2023 · 13 Apr · Shift 2 Numerical

Let α denote the greatest integer $\leq \alpha$. Then $\sqrt{1} + \sqrt{2} + \sqrt{3} + \ldots\ldots\ldots\ldots + \sqrt{120}$ is equal to

Numerical value type: the answer is a number.

Answer: 825. · Key from source paper

Q124 JEE Main 2023 · 13 Apr · Shift 2 Numerical

Let $A = \{-4, -3, -2, 0, 1, 3, 4\}$ and $R = \{(a, b) \in A \times A : b = |a| \text{ or } b^2 = a + 1\}$ be a relation on A. Then the minimum number of elements, that must be added to the relation R so that it becomes reflexive and symmetric, is

Numerical value type: the answer is a number.

Answer: 7. · Key from source paper

Q125 JEE Main 2023 · 12 Apr · Shift 1 Numerical

The number of relations, on the set $\{1, 2, 3\}$ containing $(1, 2)$ and $(2, 3)$ which are reflexive and transitive but not symmetric, is _____.

Numerical value type: the answer is a number.

Answer: 3. · Checked by our team

Q126 JEE Main 2023 · 11 Apr · Shift 1 MCQ

An organization awarded 48 medals in event 'A', 25 in event 'B' and 18 in event 'C'. If these medals went to total 60 men and only five men got medals in all the three events, then, how many received medals in exactly two of three events?

(A) 15
(B) 21
(C) 10
(D) 9

Answer: (B) 21 · Key from source paper

Q127 JEE Main 2023 · 11 Apr · Shift 2 MCQ

Let $A = \{1, 3, 4, 6, 9\}$ and $B = \{2, 4, 5, 8, 10\}$. Let R be a relation defined on $A \times B$ such that $R = \{(a_1, b_1), (a_2, b_2) : a_1 \leq b_2 \text{ and } b_1 \leq a_2\}$. Then the number of elements in the set R is

(A) 160
(B) 52
(C) 26
(D) 180

Answer: (A) 160 · Key from source paper

Q128 JEE Main 2023 · 11 Apr · Shift 2 MCQ

The domain of the function $f(x) = \frac{1}{\sqrt{[x]^2 - 3[x] - 10}}$ is (where $[x]$ denotes the greatest integer less than or equal to x)

(A) $(-\infty, -3] \cup (5, \infty)$
(B) $(-\infty, -2) \cup [6, \infty)$
(C) $(-\infty, -2) \cup (5, \infty)$
(D) $(-\infty, -3] \cup [6, \infty)$

Answer: (B) $(-\infty, -2) \cup [6, \infty)$ · Key from source paper

Q129 JEE Main 2023 · 11 Apr · Shift 2 Numerical

Let $A = \{1, 2, 3, 4, 5\}$ and $B = \{1, 2, 3, 4, 5, 6\}$. Then the number of functions $f : A \to B$ satisfying $f(1) + f(2) = f(4) - 1$ is equal to _____

Numerical value type: the answer is a number.

Answer: 360. · Key from source paper

Q130 JEE Main 2023 · 10 Apr · Shift 1 MCQ

If $fx = \frac{\tan 1\, x + \log_e 123}{x\, \log_e 1234 - \tan 1}$, $x > 0$, then the least value of $ffx + ff\frac{4}{x}$ is

(A) 0
(B) 8
(C) 2
(D) 4

Answer: (D) 4 · Checked by our team

Q131 JEE Main 2023 · 10 Apr · Shift 2 MCQ

Let $A = 2, 3, 4$ and $B = 8, 9, 12$. Then the number of elements in the relation $R = a_1, b_1, a_2, b_2 \in A \times B, A \times B : a_1$ divides b_2 and a_2 divides b_1 is

(A) 36
(B) 24
(C) 18
(D) 12

Answer: (A) 36 · Key from source paper

Q132 JEE Main 2023 · 10 Apr · Shift 2 Numerical

If the domain of the function $fx = \sec^{-1}\frac{2x}{5x+3}$ is $[\alpha, \beta) \cup (\gamma, \delta]$, then $3\alpha + 10\beta + \gamma + 21\delta$ is equal to _____

Numerical value type: the answer is a number.

Answer: 24. · Key from source paper

Q133 JEE Main 2023 · 8 Apr · Shift 1 MCQ

Let the number of elements in sets A and B be five and two respectively. Then the number of subsets of $A \times B$ each having at least 3 and at most 6 elements is

(A) 752
(B) 782
(C) 792
(D) 772

Answer: (C) 792 · Key from source paper

Q134 JEE Main 2023 · 8 Apr · Shift 1 Numerical

Let $A = \{0, 3, 4, 6, 7, 8, 9, 10\}$ and R be the relation defined on A such that $R\{(x, y) \in A \times A : x - y$ is odd positive integer or $x - y = 2\}$. The minimum number of elements that must be added to the relation R, so that it is a symmetric relation, is equal to _____

Numerical value type: the answer is a number.

Answer: 19. · Key from source paper

Q135 JEE Main 2023 · 8 Apr · Shift 2 MCQ

Let $A = \{1, 2, 3, 4, 5, 6, 7\}$. Then the relation $R = \{(x, y) \in A \times A : x + y = 7\}$ is

(A) an equivalence relation
(B) symmetric but neither reflexive nor transitive
(C) transitive but neither symmetric nor reflexive
(D) reflexive but neither symmetric nor transitive

Answer: (B) symmetric but neither reflexive nor transitive · Key from source paper

Q136 JEE Main 2023 · 8 Apr · Shift 2 Numerical

If domain of the function $\log_e\left(\frac{6x^2+5x+1}{2x-1}\right) + \cos^{-1}\left(\frac{2x^2-3x+4}{3x-5}\right)$ is $(\alpha, \beta) \cup (\gamma, \delta)$, then $18(\alpha^2 + \beta^2 + \gamma^2 + \delta^2)$ is equal to

Numerical value type: the answer is a number.

Answer: 20. · Key from source paper

Q137 JEE Main 2023 · 8 Apr · Shift 2 Numerical

Let $R = \{a, b, c, d, e\}$ and $S = \{1, 2, 3, 4\}$. Total number of onto functions $f : R \to S$ such that $f(a) \neq 1$, is equal to _____ .

Numerical value type: the answer is a number.

Answer: 180. · Key from source paper

Q138 JEE Main 2023 · 6 Apr · Shift 1 MCQ

Let $5f(x) + 4f\left(\frac{1}{x}\right) = \frac{1}{x} + 3$, $x > 0$. Then $18\int_1^2 f(x)\,dx$ is equal to

(A) $5\log_e 2 + 3$
(B) $10\log_e 2 + 6$
(C) $10\log_e 2 - 6$
(D) $5\log_e 2 - 3$

Answer: (C) $10\log_e 2 - 6$ · Key from source paper

Q139 JEE Main 2023 · 6 Apr · Shift 1 MCQ

Let $A = \{x \in \mathbb{R} : x + 3 + x + 4 \leq 3\}$, $B = x \in \mathbb{R} : 3^x \sum_{r=1}^{\infty} \left(\frac{3}{10^r}\right)^{x-3} < 3^{-3x}$, where $[t]$ denotes greatest integer function. Then,

(A) $B \subset C, A \neq B$

(B) $A \cap B = \phi$

(C) $A \subset B, A \neq B$

(D) $A = B$

Answer: (D) $A = B$ · Key from source paper

Q140 JEE Main 2023 · 6 Apr · Shift 1 Numerical

Let $A = \{1, 2, 3, 4, \ldots\ldots\ldots\ldots\ldots, 10\}$ and $B = \{0, 1, 2, 3, 4\}$. The number of elements in the relation $R = \{(a, b) \in A \times A : 2a - b^2 + 3a - b \in B\}$ is _____ .

Numerical value type: the answer is a number.

Answer: 18. · Key from source paper

Q141 JEE Main 2023 · 6 Apr · Shift 2 MCQ

Let the sets A and B denote the domain and range respectively of the function $f(x) = \frac{1}{\sqrt{[x]-x}}$, where $[x]$ denotes the smallest integer greater than or equal to x. Then among the statements

$(S1) : A \cap B = (1, \infty) - \mathbb{N}$ and

$(S2) : A \cup B = (1, \infty)$

(A) Only $(S2)$ is true

(B) Only $(S1)$ is true

(C) Neither $(S1)$ nor $(S2)$ is true

(D) Both $(S1)$ and $(S2)$ are true

Answer: (B) Only $(S1)$ is true · Checked by our team

Q142 JEE Main 2023 · 1 Feb · Shift 1 MCQ

Let R be a relation on $\mathbb{R}$, given by $R = \{a, b : 3a - 3b + \sqrt{7}$ is an irrational number $\}$. Then R is

(A) Reflexive but neither symmetric nor transitive

(B) Reflexive and transitive but not symmetric

(C) Reflexive and symmetric but not transitive

(D) An equivalence relation

Answer: (A) Reflexive but neither symmetric nor transitive · Key from source paper

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Q143 JEE Main 2023 · 1 Feb · Shift 2 MCQ

Let $P(\mathrm{S})$ denote the power set of $S = \{1, 2, 3, \ldots, 10\}$. Define the relations R_1 and R_2 on $P(\mathrm{S})$ as AR_1B if $(A \cap B^c) \cup (B \cap A^c) = \phi$ and AR_2B if $A \cup B^c = B \cup A^c, \forall A, B \in P(\mathrm{S})$. Then :

(A) both R_1 and R_2 are equivalence relations
(B) only R_1 is an equivalence relation
(C) only R_2 is an equivalence relation
(D) both R_1 and R_2 are not equivalence relations

Answer: (A) both R_1 and R_2 are equivalence relations · Key from source paper

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Q144 JEE Main 2023 · 1 Feb · Shift 2 MCQ

Let $f : R - \{0, 1\} \to R$ be a function such that $f(x) + f\left(\frac{1}{1-x}\right) = 1 + x$. Then $f(2)$ is equal to :

(A) $\frac{9}{2}$
(B) $\frac{9}{4}$
(C) $\frac{7}{4}$
(D) $\frac{7}{3}$

Answer: (B) $\frac{9}{4}$ · Key from source paper

Q145 JEE Main 2023 · 31 Jan · Shift 1 MCQ

Let R be a relation on $N \times N$ defined by a, bRc, d if and only if $adb - c = bca - d$. Then R is

(A) symmetric but neither reflexive nor transitive
(B) transitive but neither reflexive nor symmetric
(C) reflexive and symmetric but not transitive
(D) symmetric and transitive but not reflexive

Answer: (A) symmetric but neither reflexive nor transitive · Key from source paper

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Q146 JEE Main 2023 · 31 Jan · Shift 1 MCQ

If the domain of the function $fx = \frac{x}{1+x^2}$, where x is greatest integer $\leq x$, is $[2, 6)$, then its range is

(A) $\frac{5}{26}, \frac{2}{5} - \frac{9}{29}, \frac{27}{109}, \frac{18}{89}, \frac{9}{53}$
(B) $\frac{5}{26}, \frac{2}{5}$
(C) $\frac{5}{37}, \frac{2}{5} - \frac{9}{29}, \frac{27}{109}, \frac{18}{89}, \frac{9}{53}$
(D) $\frac{5}{37}, \frac{2}{5}$

Answer: (D) $\frac{5}{37}, \frac{2}{5}$ · Key from source paper

Q147 JEE Main 2023 · 31 Jan · Shift 2 MCQ

Among the relations
$S = \{(a,b) : a,b \in R - \{0\}, 2 + \frac{a}{b} > 0\}$ and $T = \{(a,b) : a,b \in R, a^2 - b^2 \in Z\}$,

(A) S is transitive but T is not
(B) both S and T are symmetric
(C) neither S not T is transitive
(D) T is symmetric but S is not

Answer: (D) T **is symmetric but** S **is not** · Key from source paper

Q148 JEE Main 2023 · 31 Jan · Shift 2 MCQ

Let $f : R - \{2,6\} \to R$ be real valued function defined as $f(x) = \frac{x^2+2x+1}{x^2-8x+12}$. Then range of f is

(A) $\left(-\infty, -\frac{21}{4}\right] \cup \left[\frac{21}{4}, \infty\right)$
(B) $\left(-\infty, -\frac{21}{4}\right] \cup [0, \infty)$
(C) $\left(-\infty, -\frac{21}{4}\right) \cup (0, \infty)$
(D) $\left(-\infty, -\frac{21}{4}\right] \cup [1, \infty)$

Answer: (B) $\left(-\infty, -\frac{21}{4}\right] \cup [0, \infty)$ · Key from source paper

Q149 JEE Main 2023 · 31 Jan · Shift 2 MCQ

The absolute minimum value, of the function $f(x) = |x^2 - x + 1| + [x^2 - x + 1]$, where $[t]$ denotes the greatest integer function, in the interval $[-1, 2]$, is

(A) $\frac{3}{2}$
(B) $\frac{1}{4}$
(C) $\frac{5}{4}$
(D) $\frac{3}{4}$

Answer: (D) $\frac{3}{4}$ · Key from source paper

Q150 JEE Main 2023 · 30 Jan · Shift 1 MCQ

The minimum number of elements that must be added to the relation $R = (a,b), (b,c)$ on the set $\{a,b,c\}$ so that it becomes symmetric and transitive is:

(A) 4
(B) 7
(C) 5
(D) 3

Answer: (B) 7 · Key from source paper

Q151 JEE Main 2023 · 30 Jan · Shift 1 MCQ

Suppose $f : R \to 0, \infty$ be a differentiable function such that $5fx + y = fx \cdot fy, \forall\, x, y \in R$, If $f3 = 320$, then $\sum_{n=0}^{5} fn$ is equal to:

(A) 6875
(B) 6575
(C) 6825
(D) 6528

Answer: (C) 6825 · Key from source paper

Q152 JEE Main 2023 · 30 Jan · Shift 1 Numerical

Let $S = \{1, 2, 3, 4, 5, 6\}$. Then the number of oneone functions $f : S \to P(S)$, where $P(S)$ denote the power set of S, such that $f(n) \subset f(m)$ where $n < m$ is

Numerical value type: the answer is a number.

Answer: 3240. · Key from source paper

Q153 JEE Main 2023 · 30 Jan · Shift 1 Numerical

Let $f^1 x = \frac{3x+2}{2x+3}$, $x \in R - -\frac{3}{2}$. For $n \geq 2$, define $f^n x = f^1 o f^{n-1} x$. If $f^5 x = \frac{ax+b}{bx+a}$, gcd$a, b = 1$, then $a + b$ is equal to _____ .

Numerical value type: the answer is a number.

Answer: 3125. · Key from source paper

Q154 JEE Main 2023 · 30 Jan · Shift 2 MCQ

The range of the function $f(x) = \sqrt{3 - x} + \sqrt{2 + x}$ is

(A) $[\sqrt{5}, \sqrt{10}]$
(B) $[2\sqrt{2}, \sqrt{11}]$
(C) $[\sqrt{5}, \sqrt{13}]$
(D) $[\sqrt{2}, \sqrt{7}]$

Answer: (A) $[\sqrt{5}, \sqrt{10}]$ · Key from source paper

Q155 JEE Main 2023 · 30 Jan · Shift 2 Numerical

Let $A = \{1, 2, 3, 5, 8, 9\}$. Then the number of possible functions $f : A \to A$ such that $f(m \cdot n) = f(m) \cdot f(n)$ for every $m, n \in A$ with $m \cdot n \in A$ is equal to

Numerical value type: the answer is a number.

Answer: 432. · Key from source paper

Q156 JEE Main 2023 · 29 Jan · Shift 1 MCQ

The domain of $f(x)=\frac{\log_{(x+1)}(x-2)}{e^{2\log_e x}-(2x+3)}$, $x \in R$ is

(A) $\mathbb{R}-\{-1,3\}$
(B) $(2,\infty)-\{3\}$
(C) $(-1,\infty)-\{3\}$
(D) $\mathbb{R}-\{3\}$

Answer: (B) $(2,\infty)-\{3\}$ · Key from source paper

Q157 JEE Main 2023 · 29 Jan · Shift 1 MCQ

Let $f: R \to R$ be a function such that $f(x)=\frac{x^2+2x+1}{x^2+1}$. Then

(A) $f(x)$ is many-one in $(-\infty,-1)$
(B) $f(x)$ is many-one in $(1,\infty)$
(C) $f(x)$ is one-one in $[1,\infty)$ but not in $(-\infty,\infty)$
(D) $f(\mathrm{x})$ is one-one in $(-\infty,\infty)$

Answer: (C) $f(x)$ **is one-one in** $[1,\infty)$ **but not in** $(-\infty,\infty)$ · Key from source paper

Q158 JEE Main 2023 · 29 Jan · Shift 1 Numerical

Let $f: \mathbb{R} \to \mathbb{R}$ be a differentiable function that satisfies the relation $f(x+y)=f(x)+f(y)-1, \forall\, x, y \in \mathbb{R}$. If $f'(0)=2$, then $|f(-2)|$ is equal to

Numerical value type: the answer is a number.

Answer: 3. · Key from source paper

Q159 JEE Main 2023 · 29 Jan · Shift 2 MCQ

Let R be a relation defined on $\mathbb{N}$ as $a\ R\ b$ is $2a+3b$ is a multiple of 5, $a, b \in \mathbb{N}$. Then R is

(A) not reflexive
(B) transitive but not symmetric
(C) symmetric but not transitive
(D) an equivalence relation

Answer: (D) an equivalence relation · Key from source paper

Q160 JEE Main 2023 · 25 Jan · Shift 1 Numerical

For some $a, b, c \in \mathbb{N}$, let $f(x)=ax-3$ and $g(x)=x^b+c$, $x \in \mathbb{R}$. If $(f \circ g)^{-1}(x)=\left(\frac{x-7}{2}\right)^{\frac{1}{3}}$, then $(f \circ g)(ac)+(g \circ f)(b)$ is equal to _____ .

Numerical value type: the answer is a number.

Answer: 2039. · Key from source paper

Q161 JEE Main 2023 · 25 Jan · Shift 2 MCQ

Let $f(x) = 2x^n + \lambda$, $\lambda \in \mathbb{R}$, $n \in \mathbb{N}$, and $f(4) = 133$, $f(5) = 255$. Then the sum of all the positive integer divisors of $(f(3) - f(2))$ is

(A) 61
(B) 60
(C) 58
(D) 59

Answer: (B) 60 · Key from source paper

Q162 JEE Main 2023 · 25 Jan · Shift 2 MCQ

Let $f : \mathbb{R} \to \mathbb{R}$ be a function defined by $f(x) = \log_{\sqrt{m}} \{\sqrt{2}(\sin x - \cos x) + m - 2\}$, for some m, such that the range of f is $[0, 2]$. Then the value of m is _____ .

(A) 5
(B) 3
(C) 2
(D) 4

Answer: (A) 5 · Key from source paper

Q163 JEE Main 2023 · 25 Jan · Shift 2 MCQ

The number of functions $f : \{1, 2, 3, 4\} \to \{a \in \mathbb{Z} : |a| \leq 8\}$ satisfying $f(n) + \frac{1}{n} f(n+1) = 1, \forall\, n \in \{1, 2, 3\}$ is

(A) 3
(B) 4
(C) 1
(D) 2

Answer: (D) 2 · Key from source paper

Q164 JEE Main 2023 · 24 Jan · Shift 1 MCQ

The relation $R = \{(a, b) : \gcd(a, b) = 1,\ 2a \neq b,\ a, b \in \mathbb{Z}\}$ is:

(A) transitive but not reflexive
(B) symmetric but not transitive
(C) reflexive but not symmetric
(D) neither symmetric nor transitive

Answer: (D) neither symmetric nor transitive · Key from source paper

EdLoop JEE

Q165 JEE Main 2023 · 24 Jan · Shift 1 MCQ

The equation $x^2 - 4x + [x] + 3 = x[x]$, where $[x]$ denotes the greatest integer function, has:

(A) exactly two solutions in $(-\infty, \infty)$
(B) no solution
(C) a unique solution in $(-\infty, 1)$
(D) a unique solution in $(-\infty, \infty)$

Answer: (D) a unique solution in $(-\infty, \infty)$ · Key from source paper

Q166 JEE Main 2023 · 24 Jan · Shift 2 Numerical

The minimum number of elements that must be added to relation $R = \{(a, b), (b, c), (b, d)\}$ on the set $\{a, b, c, d\}$, so that it is an equivalence relation is

Numerical value type: the answer is a number.

Answer: 13. · Key from source paper

Q167 JEE Main 2023 · 24 Jan · Shift 2 MCQ

If $f(x) = \frac{2^{2x}}{2^{2x}+2}$, $x \in \mathbb{R}$, then $f\left(\frac{1}{2023}\right) + f\left(\frac{2}{2023}\right) + f\left(\frac{3}{2023}\right) + \cdots\cdots\cdots + f\left(\frac{2022}{2023}\right)$ is equal to

(A) 2011
(B) 1010
(C) 2010
(D) 1011

Answer: (D) 1011 · Key from source paper

Q168 JEE Main 2023 · 24 Jan · Shift 2 MCQ

Let $f(x)$ be a function such that $f(x + y) = f(x) \cdot f(y)$ for all $x, y \in \mathrm{N}$. If $f(1) = 3$ and $\sum_{k=1}^{n} f(k) = 3279$, then the value of n is

(A) 6
(B) 8
(C) 7
(D) 9

Answer: (C) 7 · Key from source paper

Q169 JEE Main 2022 · 29 Jul · Shift 1 MCQ

Let R be a relation from the set $\{1, 2, 3 \ldots\ldots\ldots, 60\}$ to itself such that $R = \{(a, b) : b = pq$, where $p, q \geq 3$ are prime numbers$\}$. Then, the number of elements in R is

(A) 600
(B) 660
(C) 540
(D) 720

Answer: (B) 660 · Key from source paper

Q170 JEE Main 2022 · 28 Jul · Shift 1 MCQ

For $\alpha \in N$, consider a relation R on N given by $R = \{x, y : 3x + \alpha y \text{ is a multiple of } 7\}$. The relation R is an equivalence relation if and only if

(A) $\alpha = 14$
(B) α is a multiple of 4
(C) 4is the remainder when α is divided by 10
(D) 4 is the remainder when α is divided by 7

Answer: (D) 4 is the remainder when α is divided by 7 · Key from source paper

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Q171 JEE Main 2022 · 28 Jul · Shift 1 MCQ

Let α, β and γ be three positive real numbers. Let $fx = \alpha x^5 + \beta x^3 + \gamma x, x \in R$ and $g : R \to R$ be such that $gfx = x$ for all $x \in R$. If $a_1, a_2, a_3, \ldots, a_n$ be in arithmetic progression with mean zero, then the value of $fg\frac{1}{n}\sum_{i=1}^{n} fa_i$ is equal to

(A) 0
(B) 3
(C) 9
(D) 27

Answer: (A) 0 · Key from source paper

Q172 JEE Main 2022 · 27 Jul · Shift 1 MCQ

Let R_1 and R_2 be two relations defined on $\mathbb{R}$ by $aR_1b \Leftrightarrow ab \geq 0$ and $a\ R_2b \Leftrightarrow a \geq b$, then

(A) R_1 is an equivalence relation but not R_2
(B) R_2 is an equivalence relation but not R_1
(C) both R_1 and R_2 are equivalence relations
(D) neither R_1 nor R_2 is an equivalence relation

Answer: (D) neither R_1 nor R_2 is an equivalence relation · Key from source paper

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Q173 JEE Main 2022 · 27 Jul · Shift 1 MCQ

Let $f, g : \mathbb{N} - \{1\} \to \mathbb{N}$ be functions defined by $f(a) = \alpha$, where α is the maximum of the powers of those primes p such that p^α divides a, and $g(a) = a + 1$, for all $a \in \mathbb{N} - \{1\}$. Then, the function $f + g$ is

(A) one-one but not onto
(B) onto but not one-one
(C) both one-one and onto
(D) neither one-one nor onto

Answer: (D) neither one-one nor onto · Key from source paper

Q174 JEE Main 2022 · 27 Jul · Shift 2 MCQ

The domain of the function $f(x)=\sin^{-1}[2x^2-3]+\log_2\left(\log_{\frac{1}{2}}(x^2-5x+5)\right)$, where $[t]$ is the greatest integer function, is

(A) $\left(-\sqrt{\frac{5}{2}}, \frac{5-\sqrt{5}}{2}\right)$
(B) $\left(\frac{5-\sqrt{5}}{2}, \frac{5+\sqrt{5}}{2}\right)$
(C) $\left(1, \frac{5-\sqrt{5}}{2}\right)$
(D) $\left[1, \frac{5+\sqrt{5}}{2}\right)$

Answer: (C) $\left(1, \frac{5-\sqrt{5}}{2}\right)$ · Key from source paper

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Q175 JEE Main 2022 · 27 Jul · Shift 2 Numerical

The number of functions f, from the set $A=\{x\in N: x^2-10x+9\le 0\}$ to the set $B=\{n^2: n\in N\}$ such that $f(x)\le (x-3)^2+1$, for every $x\in A$, is _____ .

Numerical value type: the answer is a number.

Answer: 2880. · Checked by our team

Q176 JEE Main 2022 · 26 Jul · Shift 1 MCQ

Let $f: R\to R$ be a continuous function such that $f(3x)-f(x)=x$. If $f(8)=7$, then $f(14)$ is equal to:

(A) 4
(B) 10
(C) 11
(D) 16

Answer: (B) 10 · Key from source paper

Q177 JEE Main 2022 · 26 Jul · Shift 2 Numerical

Let $A=1,2,3,4,5,6,7$ and $B=3,6,7,9$. Then the number of elements in the set $C\subseteq A: C\cap B\neq\phi$ is _____

Numerical value type: the answer is a number.

Answer: 112. · Key from source paper

Q178 JEE Main 2022 · 25 Jul · Shift 1 MCQ

The total number of functions, $f : 1, 2, 3, 4 \to 1, 2, 3, 4, 5, 6$ such that $f1 + f2 = f3$, is equal to

(A) 60
(B) 90
(C) 108
(D) 126

Answer: (B) 90 · Key from source paper

Q179 JEE Main 2022 · 25 Jul · Shift 2 MCQ

The number of bijective function $f(1, 3, 5, 7, \cdots, 99) \to (2, 4, 6, 8, \cdots, 100)$ if $f(3) > f(5) > f(7) \cdots > f(99)$ is

(A) ${}^{50}C_1$
(B) ${}^{50}C_2$
(C) $\frac{50!}{2}$
(D) ${}^{50}C_3 \times 3!$

Answer: (A) ${}^{50}C_1$ · Key from source paper

Q180 JEE Main 2022 · 25 Jul · Shift 2 Numerical

Let $f(x)$ be a quadratic polynomial with leading coefficient 1 such that $f(0) = p, p \neq 0$, and $f(1) = \frac{1}{3}$. If the equations $f(x) = 0$ and $f \circ f \circ f \circ f(x) = 0$ have a common real root, then $f(-3)$ is equal to _____.

Numerical value type: the answer is a number.

Answer: 25. · Key from source paper

Q181 JEE Main 2022 · 25 Jul · Shift 2 Numerical

Let $A = \{1, 2, 3, 4, 5, 6, 7\}$. Define $B = \{T \subseteq A$: either $1 \notin T$ or $2 \in T\}$ and $C = \{T \subseteq A : T$ the sum of all the elements of T is a prime number.$\}$ Then the number of elements in the set $B \cup C$ is _____.

Numerical value type: the answer is a number.

Answer: 107. · Key from source paper

Q182 JEE Main 2022 · 29 Jun · Shift 1 MCQ

Let a set $A = A_1 \cup A_2 \cup \ldots \cup A_k$, where $A_i \cap A_j = \phi$ for $i \neq j$; $1 \leq i, j \leq k$. Define the relation R from A to A by $R = \{(x, y) : y \in A_i$ if and only if $x \in A_i,\ 1 \leq i \leq k\}$. Then, R is:

(A) reflexive, symmetric but not transitive
(B) reflexive, transitive but not symmetric
(C) reflexive but not symmetric and transitive
(D) an equivalence relation

Answer: (D) an equivalence relation · Key from source paper

Q183 JEE Main 2022 · 29 Jun · Shift 1 · Numerical

Let $c, k \in R$. If $f(x) = (c+1)x^2 + (1-c^2)x + 2k$ and $f(x+y) = f(x) + f(y) - xy$, for all $x, y \in R$, then the value of $|2(f(1) + f(2) + f(3) + ... + f(20))|$ is equal to _____.

Numerical value type: the answer is a number.

Answer: 3395. · Key from source paper

Q184 JEE Main 2022 · 29 Jun · Shift 2 · MCQ

The probability that a relation R from $\{x, y\}$ to $\{x, y\}$ is both symmetric and transitive, is equal to:

(A) $\frac{5}{16}$
(B) $\frac{9}{16}$
(C) $\frac{11}{16}$
(D) $\frac{13}{16}$

Answer: (A) $\frac{5}{16}$ · Key from source paper

Q185 JEE Main 2022 · 29 Jun · Shift 2 · Numerical

Let $f(x)$ and $g(x)$ be two real polynomials of degree 2 and 1 respectively. If $f(g(x)) = 8x^2 - 2x$, and $g(f(x)) = 4x^2 + 6x + 1$, then the value of $f(2) + g(2)$ is _____.

Numerical value type: the answer is a number.

Answer: 18. · Key from source paper

Q186 JEE Main 2022 · 28 Jun · Shift 1 · MCQ

Let a function $f : \mathbb{N} \to \mathbb{N}$ be defined by $f(n) = \begin{cases} 2n, & n = 2, 4, 6, 8, \ldots\ldots \\ n-1, & n = 3, 7, 11, 15, \ldots\ldots \\ \frac{n+1}{2}, & n = 1, 5, 9, 13, \ldots\ldots \end{cases}$

then, f is

(A) One-one and onto
(B) One-one but not onto
(C) Onto but not one-one
(D) Neither one-one nor onto

Answer: (A) One-one and onto · Key from source paper

Q187 JEE Main 2022 · 28 Jun · Shift 1 Numerical

Let R_1 and R_2 be relations on the set $\{1, 2, \ldots, 50\}$ such that $R_1 = \{(p, p^n) : p$ is a prime and $n \geq 0$ is an integer$\}$ and $R_2 = \{(p, p^n) : p$ is a prime and $n = 0$ or $1\}$. Then, the number of elements in $R_1 - R_2$ is _____.

Numerical value type: the answer is a number.

Answer: 8. · Key from source paper

Q188 JEE Main 2022 · 28 Jun · Shift 2 MCQ

Let $R_1 = \{(a, b) \in N \times N : |a - b| \leq 13\}$ and $R_2 = \{(a, b) \in N \times N : |a - b| \neq 13\}$ Then on N:

(A) Both R_1 and R_2 are equivalence relations
(B) Neither R_1 nor R_2 is an equivalence relation
(C) R_1 is an equivalence relation but R_2 is not
(D) R_2 is an equivalence relation but R_1 is not

Answer: (B) Neither R_1 nor R_2 is an equivalence relation · Key from source paper

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Q189 JEE Main 2022 · 28 Jun · Shift 2 Numerical

Let $S = \{1, 2, 3, 4\}$. Then the number of elements in the set $\{f : S \times S \to S : f$ is onto and $f(a, b) = f(b, a) \geq a \forall (a, b) \in S \times S\}$ is

Numerical value type: the answer is a number.

Answer: 37. · Key from source paper

Q190 JEE Main 2022 · 27 Jun · Shift 1 Numerical

Let $f : R \to R$ be a function defined by $f(x) = \frac{2e^{2x}}{e^{2x}+e}$. Then $f\left(\frac{1}{100}\right) + f\left(\frac{2}{100}\right) + f\left(\frac{3}{100}\right) + \ldots + f\left(\frac{99}{100}\right)$ is equal to _____ .

Numerical value type: the answer is a number.

Answer: 99. · Key from source paper

Q191 JEE Main 2022 · 27 Jun · Shift 2 Numerical

Let $S = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$. Define $f : S \to S$ as $f(n) = \begin{cases} 2n, & \text{if } n = 1, 2, 3, 4, 5 \\ 2n - 11 & \text{if } n = 6, 7, 8, 9, 10 \end{cases}$

Let $g : S \geq S$ be a function such that $\text{fog}(n) = \begin{cases} n + 1, & \text{if } n \text{ is odd} \\ n - 1, & \text{if } n \text{ is even} \end{cases}$, then $g(10)(g(1) + g(2) + g(3) + g(4) + g(5))$ is equal to

Numerical value type: the answer is a number.

Answer: 190. · Key from source paper

Q192 JEE Main 2022 · 26 Jun · Shift 1 MCQ

Let $f(x) = \frac{x-1}{x+1}$, $x \in R - \{0, -1, 1\}$. If $f^{n+1}(x) = f(f^n(x))$ for all $n \in N$, then $f^6(6) + f^7(7)$ is equal to

(A) $\frac{7}{6}$
(B) $-\frac{3}{2}$
(C) $\frac{7}{12}$
(D) $-\frac{11}{12}$

Answer: (B) $-\frac{3}{2}$ · Key from source paper

Q193 JEE Main 2022 · 26 Jun · Shift 2 MCQ

Let $f : \mathbb{R} \to \mathbb{R}$ be defined as $f(x) = x - 1$ and $g : R \to \{1, -1\} \to \mathbb{R}$ be defined as $g(x) = \frac{x^2}{x^2-1}$. Then the function $f \circ g$ is:

(A) One-one but not onto
(B) onto but not one-one
(C) Both one-one and onto
(D) Neither one-one nor onto

Answer: (D) Neither one-one nor onto · Key from source paper

Q194 JEE Main 2022 · 26 Jun · Shift 2 Numerical

Let $f : \mathbb{R} \to \mathbb{R}$ satisfy $f(x + y) = 2^x f(y) + 4^y f(x), \forall x, y \in \mathbb{R}$. If $f(2) = 3$, then $14 \cdot \frac{f'(4)}{f'(2)}$ is equal to _____ .

Numerical value type: the answer is a number.

Answer: 248. · Key from source paper

Q195 JEE Main 2022 · 25 Jun · Shift 1 MCQ

Let $f : N \to R$ be a function such that $fx + y = 2fxfy$ for natural numbers x and y. If $f1 = 2$, then the value of α for which $\sum_{k=1}^{10} f\alpha + k = \frac{512}{3}2^{20} - 1$ holds, is

(A) 3
(B) 4
(C) 5
(D) 6

Answer: (B) 4 · Key from source paper

Q196 JEE Main 2022 · 25 Jun · Shift 1 · Numerical

Let $f : R \to R$ be a function defined by $fx = 21 - \frac{x^{25}}{2}2 + x^{25\frac{1}{50}}$. If the function $gx = fffx + ffx$, then the greatest integer less than or equal to $g1$ is _____ .

Numerical value type: the answer is a number.

Answer: 2. · Key from source paper

Q197 JEE Main 2022 · 25 Jun · Shift 2 · MCQ

Let $A = x \in R : x + 1 < 2$ and $B = x \in R : x - 1 \geq 2$. Then which one the following statements is NOT true?

(A) $A - B = -1, 1$
(B) $B - A = R - -3, 1$
(C) $A \cap B = (-3, -1]$
(D) $A \cup B = R - [1, 3)$

Answer: (B) $B - A = R - -3, 1$ · Key from source paper

Q198 JEE Main 2022 · 24 Jun · Shift 1 · MCQ

The domain of $f(x) = \frac{\cos^{-1}\left(\frac{x^2-5x+6}{x^2-9}\right)}{\log(x^2-3x+2)}$ is

(A) $x \in \left[\frac{-1}{2}, 1\right) \cup (2, \infty) - \{3\}$
(B) $x \in \left[\frac{-1}{2}, 1\right] \cup (2, \infty) - \{3\}$
(C) $x \in \left(\frac{-1}{2}, 1\right) \cup [2, \infty) - \{3\}$
(D) $x \in \left[\frac{-1}{2}, 1\right) \cup [2, \infty) - \{3\}$

Answer: (A) $x \in \left[\frac{-1}{2}, 1\right) \cup (2, \infty) - \{3\}$ · Key from source paper

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Q199 JEE Main 2022 · 24 Jun · Shift 1 · Numerical

The number of one-one functions $f : \{a, b, c, d\} \to \{0, 1, 2, \ldots, 10\}$ such that $2f(a) - f(b) + 3f(c) + f(d) = 0$ is _____

Numerical value type: the answer is a number.

Answer: 31. · Key from source paper

Q200 JEE Main 2021 · 1 Sep · Shift 2 MCQ

The range of the function $f(x) = \log_{\sqrt{5}} 3 + \cos\frac{3\pi}{4} + x + \cos\frac{\pi}{4} + x + \cos\frac{\pi}{4} - x - \cos\frac{3\pi}{4} - x$ is :

(A) $\frac{1}{\sqrt{5}}, \sqrt{5}$

(B) $[0, 2]$

(C) $(0, \sqrt{5})$

(D) $[-2, 2]$

Answer: (B) $[0, 2]$ · Key from source paper

Q201 JEE Main 2021 · 31 Aug · Shift 1 MCQ

Which of the following is not correct for relation R on the set of real numbers?

(A) $(x, y) \in \mathrm{R} \Leftrightarrow |x| - |y| \leq 1$ is reflexive but not symmetric.

(B) $(x, y) \in \mathrm{R} \Leftrightarrow |x - y| \leq 1$ is reflexive and symmetric.

(C) $(x, y) \in \mathrm{R} \Leftrightarrow 0 < |x - y| \leq 1$ is symmetric and transitive.

(D) $(x, y) \in \mathrm{R} \Leftrightarrow 0 < |x| - |y| \leq 1$ is not transitive but symmetric.

Options (4) or (3) were accepted. More than one answer was accepted. · Key from source paper

Q202 JEE Main 2021 · 31 Aug · Shift 2 MCQ

Let $f : N \to N$ be a function such that $fm + n = fm + fn$ for every $m, n \in N$. If $f6 = 18$ then $f2 \cdot f3$ is equal to :

(A) 54

(B) 6

(C) 36

(D) 18

Answer: (A) 54 · Key from source paper

Q203 JEE Main 2021 · 31 Aug · Shift 2 Numerical

The number of 4-digit numbers which are neither multiple of 7 nor multiple of 3 is _____.

Numerical value type: the answer is a number.

Answer: 5143. · Key from source paper

Q204 JEE Main 2021 · 27 Aug · Shift 1 Numerical

If $A = \{x \in R : |x - 2| > 1\}$, $B = \{x \in R : \sqrt{x^2 - 3} > 1\}$, $C = \{x \in R : |x - 4| \geqslant 2\}$ and Z is the set of all integers, then the number of subsets of the set $(A \cap B \cap C)^c \cap Z$ is _____.

Numerical value type: the answer is a number.

Answer: 256. · Key from source paper

Q205 JEE Main 2021 · 27 Aug · Shift 2 MCQ

Let Z be the set of all integers,
$A = \{(x, y) \in Z \times Z : (x-2)^2 + y^2 \leq 4\}$
$B = \{(x, y) \in Z \times Z : x^2 + y^2 \leq 4\}$ and
$C = \{(x, y) \in Z \times Z : (x-2)^2 + (y-2)^2 \leq 4\}$
If the total number of relations from $A \cap B$ to $A \cap C$ is 2^p, then the value of p is:

(A) 25
(B) 9
(C) 16
(D) 49

Answer: (A) 25 · Key from source paper

Q206 JEE Main 2021 · 26 Aug · Shift 1 MCQ

Out of all the patients in a hospital 89% are found to be suffering from heart ailment and 98% are suffering from lungs infection. If $K\%$ of them are suffering from both ailments, then K can not belong to the set:

(A) $\{79, 81, 83, 85\}$
(B) $\{84, 87, 90, 93\}$
(C) $\{80, 83, 86, 89\}$
(D) $\{84, 86, 88, 90\}$

Answer: (A) $\{79, 81, 83, 85\}$ · Key from source paper

Q207 JEE Main 2021 · 27 Jul · Shift 1 Numerical

Let $S = \{1, 2, 3, 4, 5, 6, 7\}$. Then the number of possible functions $f : S \to S$ such that $f(m \cdot n) = f(m) \cdot f(n)$ for every $m, n \in S$ and $m \cdot n \in S$, is equal to _____.

Numerical value type: the answer is a number.

Answer: 490. · Key from source paper

Q208 JEE Main 2021 · 27 Jul · Shift 2 MCQ

Let N be the set of natural numbers and a relation R on N be defined by $R = \{(x, y) \in N \times N : x^3 - 3x^2y - xy^2 + 3y^3 = 0\}$. Then the relation R is

(A) symmetric but neither reflexive nor transitive
(B) reflexive but neither symmetric nor transitive
(C) reflexive and symmetric, but not transitive
(D) an equivalence relation

Answer: (B) reflexive but neither symmetric nor transitive · Key from source paper

EdLoop JEE

Q209 JEE Main 2021 · 27 Jul · Shift 2 Numerical

Let $A = \{n \in N \mid n^2 \leq n + 10,000\}$, $B = \{3k + 1 \mid k \in N\}$ and $C = \{2k \mid k \in N\}$, then the sum of all the elements of the set $A \cap (B - C)$ is equal to _____.

Numerical value type: the answer is a number.

Answer: 832. · Key from source paper

Q210 JEE Main 2021 · 25 Jul · Shift 1 MCQ

Let $g : N \to N$ be defined as
$g(3n + 1) = 3n + 2$
$g(3n + 2) = 3n + 3$
$g(3n + 3) = 3n + 1$, for all $n \geq 0$
Then which of the following statements is true ?

(A) There exists an onto function $f : N \to N$ such that $fog = f$
(B) There exists a one-one function $f : N \to N$ such that $fog = f$
(C) $gogog = g$
(D) There exists a function $f : N \to N$ such that $gof = f$

Answer: (A) There exists an onto function $f : N \to N$ such that $fog = f$ · Key from source paper

Q211 JEE Main 2021 · 25 Jul · Shift 2 MCQ

If $[x]$ be the greatest integer less than or equal to x, then $\sum_{n=8}^{100} \left[\frac{(-1)^n n}{2}\right]$ is equal to:

(A) 0
(B) 4
(C) -2
(D) 2

Answer: (B) 4 · Key from source paper

Q212 JEE Main 2021 · 25 Jul · Shift 2 MCQ

Consider function $f : A \to B$ and $g : B \to C (A, B, C \subseteq R)$ such that $(gof)^{-1}$ exists, then:

(A) f and g both are one-one
(B) f and g both are onto
(C) f is one-one and g is onto
(D) f is onto and g is one-one

Answer: (C) f is one-one and g is onto · Key from source paper

EdLoop JEE

Q213 JEE Main 2021 · 22 Jul · Shift 1 MCQ

Let $[x]$ denote the greatest integer less than or equal to x. Then, the values of $x \in R$ satisfying the equation $[e^x]^2 + [e^x + 1] - 3 = 0$ lie in the interval:

(A) $[0, \frac{1}{e})$
(B) $[\log_e 2, \log_e 3)$
(C) $[1, e)$
(D) $[0, \log_e 2)$

Answer: (D) $[0, \log_e 2)$ · Key from source paper

Q214 JEE Main 2021 · 22 Jul · Shift 1 Numerical

Let $A = \{0, 1, 2, 3, 4, 5, 6, 7\}$. Then the number of bijective functions $f : A \to A$ such that $f(1) + f(2) = 3 - f(3)$ is equal to

Numerical value type: the answer is a number.

Answer: 720. · Key from source paper

Q215 JEE Main 2021 · 20 Jul · Shift 1 MCQ

Let $[x]$ denote the greatest integer $\leq x$, where $x \in R$. If the domain of the real valued function $f(x) = \sqrt{\frac{|[x]|-2}{|[x]|-3}}$ is $(-\infty, a) \cup [b, c) \cup [4, \infty)$, $a < b < c$, then the value of $a + b + c$ is:

(A) 8
(B) 1
(C) -2
(D) -3

Answer: (C) -2 · Key from source paper

Q216 JEE Main 2021 · 20 Jul · Shift 2 MCQ

Let $f : R - \{\frac{\alpha}{6}\} \to R$ be defined by $f(x) = (\frac{5x+3}{6x-\alpha})$. Then the value of α for which $(fof)(x) = x$, for all $x \in R - \{\frac{\alpha}{6}\}$, is

(A) No such α exists
(B) 5
(C) 8
(D) 6

Answer: (B) 5 · Key from source paper

Q217 JEE Main 2021 · 18 Mar · Shift 1 MCQ

The real valued function $f(x) = \frac{\text{cosec}^{-1} x}{\sqrt{x-[x]}}$, where $[x]$ denotes the greatest integer less than or equal to x, is defined for all x belonging to:

(A) all reals except integers
(B) all non-integers except the interval $[-1, 1]$
(C) all integers except $0, -1, 1$
(D) all reals except the Interval $[-1, 1]$

Answer: (B) all non-integers except the interval $[-1, 1]$ · Key from source paper

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Q218 JEE Main 2021 · 18 Mar · Shift 1 MCQ

If the functions are defined as $f(x) = \sqrt{x}$ and $g(x) = \sqrt{1-x}$, then what is the common domain of the following functions: $f+g,\ f-g,\ f/g,\ g/f,\ g-f$, where $(f \pm g)(x) = f(x) \pm g(x), (f/g)(x) = \frac{f(x)}{g(x)}$

(A) $0 \le x \le 1$
(B) $0 \le x < 1$
(C) $0 < x < 1$
(D) $0 < x \le 1$

Answer: (C) $0 < x < 1$ · Key from source paper

Q219 JEE Main 2021 · 18 Mar · Shift 2 MCQ

Define a relation R over a class of $n \times n$ real matrices A and B as "ARB iff there exists a non-singular matrix P such that $PAP^{-1} = B$". Then which of the following is true ?

(A) R is symmetric, transitive but not reflexive
(B) R is reflexive, symmetric but not transitive
(C) R is an equivalence relation
(D) R is reflexive, transitive but not symmetric

Answer: (C) R is an equivalence relation · Key from source paper

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Q220 JEE Main 2021 · 18 Mar · Shift 2 MCQ

Let $f : R - \{3\} \to R - \{1\}$ be defined by $f(x) = \frac{x-2}{x-3}$. Let $g : R \to R$ be given as $g(x) = 2x - 3$. Then, the sum of all the values of x for which $f^{-1}(x) + g^{-1}(x) = \frac{13}{2}$ is equal to

(A) 7
(B) 2
(C) 5
(D) 3

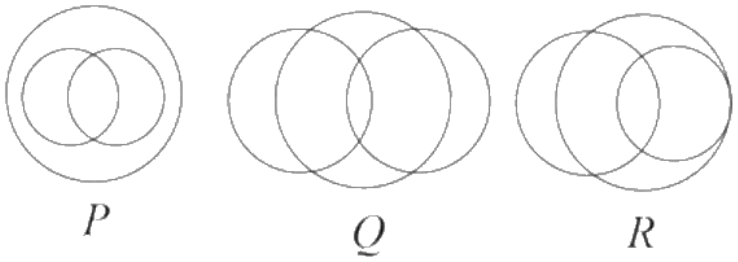
Answer: (C) 5 · Key from source paper

Q221 JEE Main 2021 · 17 Mar · Shift 1 MCQ

In a school, there are three types of games to be played. Some of the students play two types of games, but none play all the three games. Which Venn diagrams can justify the above statement?

(see the figure above)

Q70. In a school, there are three types of games to be played. Some of the students play two types of games, but none play all the three games. Which Venn diagrams can justify the above statement?



(1) P and Q
(2) P and R
(3) Q and R
(4) None of these

(A) P and Q
(B) P and R
(C) Q and R
(D) None of these

Answer: (D) None of these · Key from source paper

Q222 JEE Main 2021 · 17 Mar · Shift 1 MCQ

The inverse of $y = 5^{\log x}$ is:

(A) $x = 5^{\log y}$
(B) $x = y^{\log 5}$
(C) $y = x^{\frac{1}{\log 5}}$
(D) $x = 5^{\frac{1}{\log y}}$

Answer: (C) $y = x^{\frac{1}{\log 5}}$ · Key from source paper

Q223 JEE Main 2021 · 16 Mar · Shift 2 MCQ

Let $A = \{2, 3, 4, 5, \ldots, 30\}$ and $\simeq$ be an equivalence relation on $A \times A$, defined by $(a, b) \simeq (c, d)$, if and only if $ad = bc$. Then the number of ordered pairs which satisfy this equivalence relation with ordered pair $(4, 3)$ is equal to :

(A) 5
(B) 6
(C) 8
(D) 7

Answer: (D) 7 · Key from source paper

Q224 JEE Main 2021 · 26 Feb · Shift 1 MCQ

Let $R = \{(P, Q) | P$ and Q are at the same distance from the origin$\}$ be a relation, then the equivalence class of $(1, -1)$ is the set

(A) $S = \{(x, y) | x^2 + y^2 = 1\}$
(B) $S = \{(x, y) | x^2 + y^2 = 2\}$
(C) $S = \{(x, y) | x^2 + y^2 = \sqrt{2}\}$
(D) $S = \{(x, y) | x^2 + y^2 = 4\}$

Answer: (B) $S = \{(x, y) | x^2 + y^2 = 2\}$ · Key from source paper

Q225 JEE Main 2021 · 26 Feb · Shift 2 MCQ

Let $A = \{1, 2, 3, \ldots, 10\}$ and $f : A \to A$ be defined as

$$f(k) = \begin{cases} k+1 & \text{if } k \text{ is odd} \\ k & \text{if } k \text{ is even} \end{cases}$$

Then the number of possible functions $g : A \to A$ such that $g \circ f = f$ is:

(A) ${}^{10}C_5$
(B) 5^5
(C) $5!$
(D) 10^5

Answer: (D) 10^5 · Key from source paper

Q226 JEE Main 2021 · 25 Feb · Shift 1 MCQ

Let $f, g : N \to N$ such that $f(n+1) = f(n) + f(1)\ \forall\ n \in N$ and g be any arbitrary function. Which of the following statements is NOT true?

(A) If f is onto, then $f(n) = n \forall n \in N$
(B) If g is onto, then fog is one-one
(C) f is one-one
(D) If fog is one-one, then g is one-one

Answer: (B) If g is onto, then fog is one-one · Key from source paper

Q227 JEE Main 2021 · 25 Feb · Shift 2 MCQ

A function $f(x)$ is given by $f(x) = \frac{5^x}{5^x+5}$, then the sum of the series $f\left(\frac{1}{20}\right) + f\left(\frac{2}{20}\right) + f\left(\frac{3}{20}\right) + \ldots + f\left(\frac{39}{20}\right)$ is equal to:

(A) $\frac{19}{2}$
(B) $\frac{49}{2}$
(C) $\frac{39}{2}$
(D) $\frac{29}{2}$

Answer: (C) $\frac{39}{2}$ · Key from source paper

Q228 JEE Main 2021 · 25 Feb · Shift 2 MCQ

Let x denote the total number of one-one functions from a set A with 3 elements to a set B with 5 elements and y denote the total number of one-one functions from the set A to the set $A \times B$. Then :

(A) $y = 273x$
(B) $2y = 273x$
(C) $2y = 91x$
(D) $y = 91x$

Answer: (C) $2y = 91x$ · Key from source paper

Q229 JEE Main 2021 · 24 Feb · Shift 1 MCQ

Let $f : R \to R$ be defined as $fx = 2\ x - 1$ and $g : R - 1 \to R.$ be defined as $gx = \frac{x-\frac{1}{2}}{x-1}$. Then the composition function fgx is:

(A) neither one-one nor onto
(B) one-one but not onto
(C) onto but not one-one
(D) both one-one and onto

Answer: (B) one-one but not onto · Key from source paper

Q230 JEE Main 2021 · 24 Feb · Shift 2 Numerical

If $a + \alpha = 1, b + \beta = 2$ and $af(x) + \alpha f\left(\frac{1}{x}\right) = bx + \frac{\beta}{x}, x \neq 0$, then the value of the expression $\frac{f(x)+f\left(\frac{1}{x}\right)}{x+\frac{1}{x}}$ is _____.

Numerical value type: the answer is a number.

Answer: 2. · Key from source paper

Q231 JEE Main 2020 · 6 Sep · Shift 1 MCQ

If $f(x + y) = f(x)\ f(y)$ and $\sum_{x=1}^{\infty} f(x) = 2, x, y \in N$, where N is the set of all natural numbers, then the value of $\frac{f(4)}{f(2)}$ is

(A) $\frac{2}{3}$
(B) $\frac{1}{9}$
(C) $\frac{1}{3}$
(D) $\frac{4}{9}$

Answer: (D) $\frac{4}{9}$ · Key from source paper

Q232 JEE Main 2020 · 6 Sep · Shift 1 Numerical

Set A has m elements and set B has n elements. If the total number of subsets of A is 112 more than the total number of subsets of B, then the value of $m \cdot n$ is _____.

Numerical value type: the answer is a number.

Answer: 28. · Key from source paper

Q233 JEE Main 2020 · 6 Sep · Shift 2 MCQ

For a suitably chosen real constant a, let a function, $f : \mathbf{R} - \{-a\} \to \mathbf{R}$ be defined by $f(x) = \frac{a-x}{a+x}$. Further supposed that for any real number $x \neq -a$,and $f(x) \neq -a$, $(f \circ f)(x) = x$. Then $f\left(-\frac{1}{2}\right)$ is equal to :

(A) $\frac{1}{3}$
(B) $-\frac{1}{3}$
(C) -3
(D) 3

Answer: (D) 3 · Key from source paper

Q234 JEE Main 2020 · 6 Sep · Shift 2 Numerical

Suppose that a function $f : \mathbf{R} \to \mathbf{R}$ satisfies $f(x + y) = f(x)\, f(y)$ for all x, y ε R and $f(1) = 3$. If $\sum_{i=1}^{n} f(i) = 363$, then n is equal to _____.

Numerical value type: the answer is a number.

Answer: 5. · Key from source paper

Q235 JEE Main 2020 · 5 Sep · Shift 1 MCQ

A survey shows that 73% of the persons working in an office like coffee, whereas 65% like tea. If x denotes the percentage of them, who like both coffee and tea, then x cannot be:

(A) 63
(B) 36
(C) 54
(D) 38

Answer: (B) 36 · Key from source paper

Q236 JEE Main 2020 · 5 Sep · Shift 2 Numerical

Let $A = \{a, b, c\}$ and $B = \{1, 2, 3, 4\}$. Then the number of elements in the set$C = \{f : A \to B \mid 2 \in f(A)$ and f is not one-one$\}$ is _____

Numerical value type: the answer is a number.

Answer: 19. · Key from source paper

Q237 JEE Main 2020 · 4 Sep · Shift 1 MCQ

Let $[t]$ denote the greatest integer$\leq t$. Then the equation in x, $[x]^2 + 2[x + 2] - 7 = 0$ has :

(A) exactly two solutions
(B) exactly four integral solutions
(C) no integral solution
(D) infinitely many solutions

Answer: (D) infinitely many solutions · Key from source paper

Q238 JEE Main 2020 · 4 Sep · Shift 1 MCQ

A survey shows that 63% of the people in a city read newspaper A whereas 76% read news paper B. If $x\%$ of the people read both the newspapers, then a possible value of x can be:

(A) 29
(B) 37
(C) 65
(D) 55

Answer: (D) 55 · Key from source paper

Q239 JEE Main 2020 · 4 Sep · Shift 2 MCQ

Let $\bigcup_{i=1}^{50} X_i = \bigcup_{i=1}^{n} Y_i = T$, where each X_i contains 10 elements and each Y_i contains 5 elements. If each element of the set T is an element of exactly 20 sets X_i's and exactly 6 sets Y_i's then n is equal to :

(A) 15
(B) 50
(C) 45
(D) 30

Answer: (D) 30 · Key from source paper

Q240 JEE Main 2020 · 3 Sep · Shift 1 MCQ

Consider the two sets:
$A = \{m \in R$: both the roots of $x^2 - (m + 1)x + m + 4 = 0$ are real $\}$ and $B = [-3, 5)$. Which of the

following is not true?

(A) $A - B = (-\infty, -3) \cup (5, \infty)$

(B) $A \cap B = \{-3\}$

(C) $B - A = (-3, 5)$

(D) $A \cup B = R$

Answer: (A) $A - B = (-\infty, -3) \cup (5, \infty)$ · Key from source paper

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Q241 JEE Main 2020 · 3 Sep · Shift 2 MCQ

Let R_1 and R_2 be two relations defined as follows : $R_1 = \{(a,\ b) \in R^2 : a^2 + b^2 \in Q\}$ and $R_2 = \{(a,\ b) \in R^2 : a^2 + b^2 \notin Q\}$, where Q is the set of all rational numbers, then

(A) R_1 is transitive but R_2 is not transitive.

(B) R_2 is transitive but R_1 is not transitive.

(C) Neither R_1 nor R_2 is transitive.

(D) R_1 and R_2 are both transitive.

Answer: (C) Neither R_1 nor R_2 is transitive. · Key from source paper

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Q242 JEE Main 2020 · 2 Sep · Shift 1 MCQ

If $R = \{(x, y) : x, y \in Z,\ x^2 + 3y^2 \leq 8\}$ is a relation on the set of integers Z, then the domain of R^{-1} is

(A) $\{-2, -1, 1, 2\}$

(B) $\{0, 1\}$

(C) $\{-2, -1, 0, 1, 2\}$

(D) $\{-1, 0, 1\}$

Answer: (D) $\{-1, 0, 1\}$ · Key from source paper

Q243 JEE Main 2020 · 2 Sep · Shift 2 MCQ

Let $f : R \to R$ be a function which satisfies $f(x + y) = f(x) + f(y),\ \forall x, y \in R$. If $f(1) = 2$ and $g(n) = \sum_{k=1}^{(n-1)} f(k),\ n \in N$ then the value of n, for which $g(n) = 20$, is

(A) 5

(B) 20

(C) 4

(D) 9

Answer: (A) 5 · Key from source paper

Q244 JEE Main 2020 · 9 Jan · Shift 2 MCQ

If $A = \{x \in R : |x| < 2\}$ and $B = \{x \in R : |x - 2| \geq 3\}$; then

(A) $A \cap B = (-2, -1)$
(B) $B - A = R - (-2, 5)$
(C) $A \cup B = R - (2, 5)$
(D) $A - B = [-1, 2)$

Answer: (B) $B - A = R - (-2, 5)$ · Key from source paper

Q245 JEE Main 2020 · 8 Jan · Shift 1 MCQ

The inverse function of $f(x) = \frac{8^{2x} - 8^{-2x}}{8^{2x} + 8^{-2x}}$, $x \in (-1, 1)$, is _____.

(A) $\frac{1}{4} \log_e \left(\frac{1+x}{1-x}\right)$
(B) $\frac{1}{4} \log_e \left(\frac{1-x}{1+x}\right)$
(C) $\frac{1}{4} (\log_e 8) \log_e \left(\frac{1-x}{1+x}\right)$
(D) $\frac{1}{4} \log_8 \left(\frac{1+x}{1-x}\right)$

Answer: (D) $\frac{1}{4} \log_8 \left(\frac{1+x}{1-x}\right)$ · Key from source paper

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Q246 JEE Main 2020 · 8 Jan · Shift 2 MCQ

Let $f : (1, 3) \to R$, be a function defined by $f(x) = \frac{x[x]}{1+x^2}$, where $[x]$, denotes the greatest integer $\leq x$. Then the range of f, is

(A) $\left(\frac{2}{5}, \frac{3}{5}\right] \cup \left(\frac{3}{4}, \frac{4}{5}\right)$
(B) $\left(\frac{2}{5}, \frac{1}{2}\right) \cup \left(\frac{3}{5}, \frac{4}{5}\right]$
(C) $\left(\frac{2}{5}, \frac{4}{5}\right]$
(D) $\left(\frac{3}{5}, \frac{4}{5}\right)$

Answer: (B) $\left(\frac{2}{5}, \frac{1}{2}\right) \cup \left(\frac{3}{5}, \frac{4}{5}\right]$ · Key from source paper

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Q247 JEE Main 2020 · 7 Jan · Shift 1 MCQ

If $g(x) = x^2 + x - 1$ and $(g \circ f)(x) = 4x^2 - 10x + 5$, then $f\left(\frac{5}{4}\right)$ is equal to

(A) $\frac{3}{2}$
(B) $-\frac{1}{2}$
(C) $\frac{1}{2}$
(D) $-\frac{3}{2}$

Answer: (B) $-\frac{1}{2}$ · Key from source paper

Q248 JEE Main 2020 · 7 Jan · Shift 2 Numerical

Let $X = \{n \in N : 1 \leq n \leq 50\}$. If $A = \{n \in X : \text{n is a multiple of } 2\}$ and $B = \{n \in X : \text{n is a multiple of } 7\}$, then the number of elements in the smallest subset of X, containing both A and B, is.

Numerical value type: the answer is a number.

Answer: 29. · Key from source paper

Q249 JEE Main 2019 · 12 Apr · Shift 1 MCQ

For $x \in R$, Let $[x]$ denotes the greatest integer $\leq x$, then the sum of the series $-\frac{1}{3} + -\frac{1}{3} - \frac{1}{100} + -\frac{1}{3} - \frac{2}{100} + \ldots\ldots + -\frac{1}{3} - \frac{99}{100}$ is

(A) -131
(B) -153
(C) -135
(D) -133

Answer: (D) -133 · Key from source paper

Q250 JEE Main 2019 · 12 Apr · Shift 1 MCQ

For $x \in \left(0, \frac{3}{2}\right)$, let $fx = \sqrt{x}, gx = \tan x$ and $hx = \frac{1-x^2}{1+x^2}$. If $\phi x = (\text{hof})\text{og}\,(x)$, then $\phi\,\frac{\pi}{3}$ is equal to:

(A) $\tan\frac{\pi}{12}$
(B) $\tan\frac{5\pi}{12}$
(C) $\tan\frac{7\pi}{12}$
(D) $\tan\frac{11\pi}{12}$

Answer: (D) $\tan\frac{11\pi}{12}$ · Key from source paper

Q251 JEE Main 2019 · 12 Apr · Shift 2 MCQ

Let A, B and C be sets such that $\phi \neq A \cap B \subseteq C$. Then which of the following statements is not true?

(A) $B \cap C \neq \phi$
(B) $(C \cup A) \cap (C \cup B) = C$
(C) If $(A - B) \subseteq C$, then $A \subseteq C$
(D) If $(A - C) \subseteq B$, then $A \subseteq B$

Answer: (D) If $(A - C) \subseteq B$, then $A \subseteq B$ · Key from source paper

Q252 JEE Main 2019 · 10 Apr · Shift 1 MCQ

Let $f(x) = x^2$, $x \in R$. For any $A \subseteq R$, define $g(A) = \{x \in R : f(x) \in A\}$. If $S = [0, 4]$, then which one of the following statements is not true?

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(A) $g(f(S)) \neq S$
(B) $f(g(S)) \neq f(S)$
(C) $f(g(S)) = S$
(D) $g(f(S)) = g(S)$

Answer: (D) $g(f(S)) = g(S)$ · Key from source paper

Q253 JEE Main 2019 · 9 Apr · Shift 1 MCQ

If the function $f : R - \{1, -1\} \to A$ defined by $f(x) = \dfrac{x^2}{1 - x^2}$, is surjective, then A is equal to

(A) $[0, \infty)$
(B) $R - \{-1\}$
(C) $R - [-1, 0)$
(D) $R - (-1, 0)$

Answer: (C) $R - [-1, 0)$ · Key from source paper

Q254 JEE Main 2019 · 9 Apr · Shift 1 MCQ

Let $\sum_{k=1}^{10} f(a + k) = 16\left(2^{10} - 1\right)$, where the function f satisfies $f(x + y) = f(x)f(y)$ for all natural numbers x, y and $f(1) = 2$. Then the natural number 'a' is:

(A) 3
(B) 16
(C) 4
(D) 2

Answer: (A) 3 · Key from source paper

Q255 JEE Main 2019 · 9 Apr · Shift 2 MCQ

The domain of the definition of the function $f(x) = \dfrac{1}{4 - x^2} + \log_{10}(x^3 - x)$ is:

(A) $(-1, 0) \cup (1, 2) \cup (2, \infty)$
(B) $(1, 2) \cup (2, \infty)$
(C) $(-2, -1) \cup (-1, 0) \cup (2, \infty)$
(D) $(-1, 0) \cup (1, 2) \cup (3, \infty)$

Answer: (A) $(-1, 0) \cup (1, 2) \cup (2, \infty)$ · Key from source paper

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Q256 JEE Main 2019 · 8 Apr · Shift 1 MCQ

If $fx = \log_e \dfrac{1 - x}{1 + x}$, $x < 1$, then $f\dfrac{2x}{1 + x^2}$ is equal to

(A) fx^2
(B) $2fx^2$
(C) $-2fx$
(D) $2fx$

Answer: (D) $2fx$ · Key from source paper

Q257 JEE Main 2019 · 8 Apr · Shift 2 MCQ

Let $fx = \mathrm{a}^x$ ($\mathrm{a} > 0$) be written as $fx = f_1x + f_2x$, where $f_1(x)$ is an even function and $f_2(x)$ is an odd function. Then $f_1x + y + f_1(x - y)$ equals:

(A) $2f_1xf_1y$
(B) $2f_1x + yf_1x - y$
(C) $2f_1xf_2y$
(D) $2f_1x + yf_2x - y$

Answer: (A) $2f_1xf_1y$ · Key from source paper

Q258 JEE Main 2019 · 12 Jan · Shift 2 MCQ

Let Z be the set of integers. If $A = \left\{x \in Z : 2^{(x+2)(x^2-5x+6)} = 1\right\}$ and $B = \{x \in Z : -3 < 2x - 1 < 9\}$, then the number of subsets of the set $A \times B$, is :

(A) 2^{12}
(B) 2^{10}
(C) 2^{18}
(D) 2^{15}

Answer: (D) 2^{15} · Key from source paper

Q259 JEE Main 2019 · 11 Jan · Shift 1 MCQ

Let $f : R \to R$ be defined by $f(x) = \frac{x}{1+x^2}$, $x \in R$. Then the range of f is

(A) $\left[-\frac{1}{2}, \frac{1}{2}\right]$
(B) $R - [-1, 1]$
(C) $R - \left[-\frac{1}{2}, \frac{1}{2}\right]$
(D) $(-1, 1) - \{0\}$

Answer: (A) $\left[-\frac{1}{2}, \frac{1}{2}\right]$ · Key from source paper

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Q260 JEE Main 2019 · 11 Jan · Shift 2 MCQ

Let a function $f : (0, \infty) \to (0, \infty)$ be defined by $f(x) = \left|1 - \frac{1}{x}\right|$. Then f is :

(A) not injective but it is surjective
(B) injective only
(C) neither injective nor surjective
(D) None of the above

Answer: (D) None of the above · Key from source paper

Q261 JEE Main 2019 · 11 Jan · Shift 2 MCQ

The number of functions f from $\{1, 2, 3, ..., 20\}$ onto $\{1, 2, 3, ..., 20\}$ such that $f(k)$ is a multiple of 3, whenever k is a multiple of 4 is:

(A) $6^5 \times (15)!$
(B) $5! \times 6!$
(C) $(15)! \times 6!$
(D) $5^6 \times 15$

Answer: (C) $(15)! \times 6!$ · Key from source paper

Q262 JEE Main 2019 · 10 Jan · Shift 1 MCQ

In a class of 140 students numbered 1 to140 , all even numbered students opted Mathematics course, those whose number is divisible by 3 opted Physics course and those whose number is divisible by 5 opted Chemistry course. Then the number of students who did not opt for any of the three courses is:

(A) 42
(B) 1
(C) 38
(D) 102

Answer: (C) 38 · Key from source paper

Q263 JEE Main 2019 · 10 Jan · Shift 2 MCQ

Let N be the set of natural numbers and two functions f and g be defined as $f, g : N \to N$ such that

$$f(n) = \begin{cases} \frac{n+1}{2}, & \text{if } n \text{ is odd} \\ \frac{n}{2}, & \text{if } n \text{ is even} \end{cases}$$

and $g(n) = n - (-1)^n$. Then fog is:

(A) onto but not one-one
(B) Both one-one and onto
(C) One-one but not onto
(D) Neither one-one nor onto

Answer: (A) onto but not one-one · Key from source paper

Q264 JEE Main 2019 · 9 Jan · Shift 1 MCQ

For $x \in R - 0,\ 1$, let $f_1x = \frac{1}{x}$, $f_2x = 1 - x$ and $f_3x = \frac{1}{1-x}$ be three given functions. If a function, Jx satisfies $f_2oJof_1x = f_3x$ then Jx is equal to:

(A) f_3x
(B) $\frac{1}{x}f_3x$
(C) f_1x
(D) f_2x

Answer: (A) f_3x · Key from source paper

Q265 JEE Main 2019 · 9 Jan · Shift 2 MCQ

Let $f : [0,1] \to R$ be such that $f(xy) = f(x).f(y)$, for all $x, y \in [0,1]$, and $f(0) \neq 0$. If $y = y(x)$ satisfies the differential equation, $\frac{dy}{dx} = f(x)$ with $y(0) = 1$ then $y\left(\frac{1}{4}\right) + y\left(\frac{3}{4}\right)$ is equal to:

(A) 5
(B) 2
(C) 3
(D) 4

Answer: (C) 3 · Key from source paper

Q266 JEE Main 2019 · 9 Jan · Shift 2 MCQ

Let $A = \{x \in R : x \text{ is not a positive integer}\}$. Define a function $f : A \to R$ as $f(x) = \frac{2x}{x-1}$, then f is:

(A) Injective but not surjective
(B) Not injective
(C) Surjective but not injective
(D) Neither injective nor surjective

Answer: (A) Injective but not surjective · Key from source paper

Q267 JEE Main 2018 · 16 Apr · Online MCQ

Let N denote the set of all natural numbers. Define two binary relations on N as $R_1 = \{(x,y) \in N \times N : 2x + y = 10\}$ and $R_2 = \{(x,y) \in N \times N : x + 2y = 10\}$. Then

(A) both R_1 and R_2 are transitive relations

(B) range of R_2 is $\{1, 2, 3, 4\}$

(C) range of R_1 is $\{2, 4, 8\}$

(D) both R_1 and R_2 are symmetric relations

Answer: (B) range of R_2 is $\{1, 2, 3, 4\}$ · Key from source paper

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Q268 JEE Main 2018 · 15 Apr · Shift 1 MCQ

Consider the following two binary relations on the set $A = \{a, b, c\}$: $R_1 = \{(c, a)(b, b), (a, c), (c, c), (b, c), (a, a)\}$ and $\mathrm{R}_2 = \{(\mathrm{a}, \mathrm{b}), (\mathrm{b}, \mathrm{a}), (\mathrm{c}, \mathrm{c}), (\mathrm{c}, \mathrm{a}), (\mathrm{a}, \mathrm{a}), (\mathrm{b}, \mathrm{b}), (\mathrm{a}, \mathrm{c})$. Then

(A) R_2 is symmetric but it is not transitive

(B) Both R_1 and R_2 are transitive

(C) Both R_1 and R_2 are not symmetric

(D) R_1 is not symmetric but it is transitive

Answer: (A) R_2 is symmetric but it is not transitive · Key from source paper

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Q269 JEE Main 2018 · 15 Apr · Shift 2 MCQ

Let $f : \mathrm{A} \to \mathrm{B}$ be a function defined as $f(x) = \frac{x-1}{x-2}$, where $A = R - \{2\}$ and $B = R - \{1\}$. Then f is

(A) invertible and $f^{-1}(y) = \dfrac{2y+1}{y-1}$

(B) invertible and $f^{-1}(y) = \dfrac{3y-1}{y-1}$

(C) no invertible

(D) invertible and $f^{-1}(y) = \dfrac{2y-1}{y-1}$

Answer: (D) invertible and $f^{-1}(y) = \dfrac{2y-1}{y-1}$ · Key from source paper

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Q270 JEE Main 2018 · 8 Apr · Offline MCQ

Two sets A and B are as under: $A = \{(a,\ b) \in R \times R : |a-5| < 1 \text{ and } |b-5| < 1\}$; $B = \left\{(a,\ b) \in R \times R : 4(a-6)^2 + 9(b-5)^2 \leq 36\right\}$. Then :

(A) neither $A \subset B$ nor $B \subset A$

(B) $B \subset A$

(C) $A \subset B$

(D) $A \cap B = \phi$ (an empty set)

Answer: (C) $A \subset B$ · Key from source paper

Q271 JEE Main 2017 · 9 Apr · Online MCQ

The function $f : N \to I$ defined by $f(x) = x - 5\left[\frac{x}{5}\right]$, where N is the set of natural numbers and $[x]$ denotes the greatest integer less than or equal to x, is:

(A) one-one but not onto
(B) one-one and onto
(C) neither one-one nor onto
(D) onto but not one-one

Answer: (C) neither one-one nor onto · Key from source paper

Q272 JEE Main 2017 · 9 Apr · Online MCQ

If $f\left(\frac{3x-4}{3x+4}\right) = x + 2,\ x \neq -\frac{4}{3}$, and $\int f(x)\,dx = A\log|1-x| + Bx + C$, then the ordered pair $(A,\ B)$ is equal to

(A) $\left(-\frac{8}{3},\ -\frac{2}{3}\right)$
(B) $\left(-\frac{8}{3},\ \frac{2}{3}\right)$
(C) $\left(\frac{8}{3},\ \frac{2}{3}\right)$
(D) $\left(\frac{8}{3},\ -\frac{2}{3}\right)$

Answer: (B) $\left(-\frac{8}{3},\ \frac{2}{3}\right)$ · Key from source paper

Q273 JEE Main 2017 · 8 Apr · Online MCQ

Let $f(x) = 2^{10}x + 1$ and $g(x) = 3^{10}x - 1$. If $(fog)(x) = x$, then x is equal to:

(A) $\frac{2^{10}-1}{2^{10}-3^{-10}}$
(B) $\frac{1-2^{-10}}{3^{10}-2^{-10}}$
(C) $\frac{3^{10}-1}{3^{10}-2^{-10}}$
(D) $\frac{1-3^{-10}}{2^{10}-3^{-10}}$

Answer: (B) $\frac{1-2^{-10}}{3^{10}-2^{-10}}$ · Key from source paper

Q274 JEE Main 2017 · 2 Apr · Offline MCQ

The function $f : R \to \left[-\frac{1}{2}, \frac{1}{2}\right]$ defined as $f(x) = \frac{x}{1+x^2}$, is:

(A) Invertible
(B) Injective but not surjective
(C) Surjective but not injective
(D) Neither injective nor surjective

Answer: (C) Surjective but not injective · Key from source paper

Q275 JEE Main 2017 · 2 Apr · Offline MCQ

Let $a,\ b,\ c \in R$. If $f(x) = ax^2 + bx + c$ is such that $a + b + c = 3$ and $f(x + y) = f(x) + f(y) + xy,\ \forall\ x,\ y \in R$, then $\sum_{n=1}^{10} f(n)$ is equal to:

(A) 330
(B) 165
(C) 190
(D) 255

Answer: (A) 330 · Key from source paper

Q276 JEE Main 2016 · 9 Apr · Online MCQ

For $x \in R,\ x \neq 0,\ x \neq 1$, let $f_0(x) = \frac{1}{1-x}$ and $f_{n+1}(x) = f_0(f_n(x)),\ n = 0,\ 1,\ 2, \ldots..$ Then the value of $f_{100}(3) + f_1\left(\frac{2}{3}\right) + f_2\left(\frac{3}{2}\right)$ is equal to :

(A) $\frac{8}{3}$
(B) $\frac{4}{3}$
(C) $\frac{5}{3}$
(D) $\frac{1}{3}$

Answer: (C) $\frac{5}{3}$ · Key from source paper

Q277 JEE Main 2016 · 3 Apr · Offline MCQ

If $f(x) + 2f\left(\frac{1}{x}\right) = 3x,\ x \neq 0$, and $S = \{x \in R : f(x) = f(-x)\}$, then S

(A) Contains exactly two elements
(B) Contains more than two elements
(C) Is an empty set
(D) Contains exactly one element

Answer: (A) Contains exactly two elements · Key from source paper

Q278 JEE Main 2015 · 11 Apr · Online MCQ

Let $A = \{x_1, x_2, \ldots, x_7\}$ and $B = \{y_1, y_2, y_3\}$ be two sets containing seven and three distinct elements respectively. Then the total number of functions $f : A \to B$ that are onto, if there exist exactly three elements x in A such that $f(x) = y_2$, is equal to:

(A) $12 \cdot {}^7C_2$
(B) $16 \cdot {}^7C_3$
(C) $14 \cdot {}^7C_3$
(D) $14 \cdot {}^7C_2$

Answer: (C) $14 \cdot {}^7C_3$ · Key from source paper

Q279 JEE Main 2015 · 10 Apr · Online MCQ

In a certain town, 25% of the families own a phone and 15% own a car; 65% families own neither a phone nor a car and 2000 families own both a car and a phone. Consider the following three statements:

(i) 5% families own both a car and a phone.
(ii) 35% families own either a car or a phone.
(iii) 40000 families live in the town.
Then,

(A) Only (ii) and (iii) are correct
(B) Only (i) and (ii) are correct
(C) All (i), (ii) and (iii) are correct
(D) Only (i) and (iii) are correct

Answer: (C) All (i), (ii) and (iii) are correct · Key from source paper

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Q280 JEE Main 2015 · 4 Apr · Offline MCQ

Let A and B be two sets containing four and two elements respectively. Then the number of subsets of the set $A \times B$, each having at least three elements is

(A) 510
(B) 219
(C) 256
(D) 275

Answer: (B) 219 · Key from source paper

Q281 JEE Main 2014 · 19 Apr · Online MCQ

Let $f(n) = \left[\frac{1}{3} + \frac{3n}{100}\right] n$, where $[n]$ denotes the greatest integer less than or equal to n. Then $\sum_{n=1}^{56} f(n)$ is equal to

(A) 56
(B) 1287
(C) 1399
(D) 689

Answer: (C) 1399 · Key from source paper

Q282 JEE Main 2014 · 19 Apr · Online MCQ

The function $f(x) = |\sin 4x| + |\cos 2x|$, is a periodic function with a fundamental period

(A) π
(B) 2π
(C) $\frac{\pi}{4}$
(D) $\frac{\pi}{2}$

Answer: (D) $\frac{\pi}{2}$ · Key from source paper

EdLoop JEE

Q283 JEE Main 2014 · 19 Apr · Online MCQ

Let $f : R \to R$ be defined by $f(x) = \frac{|x|-1}{|x|+1}$, then f is

(A) one-one but not onto
(B) neither one-one nor onto
(C) both one-one and onto
(D) onto but not one-one

Answer: (B) neither one-one nor onto · Key from source paper

Q284 JEE Main 2014 · 12 Apr · Online MCQ

A relation on the set $\mathrm{A} = \{\mathrm{x} : |\mathrm{x}| < 3, \mathrm{x} \in Z\}$, where Z is the set of integers is defined by $\mathrm{R} = \{(\mathrm{x}, \mathrm{y}) : \mathrm{y} = |\mathrm{x}|, \mathrm{x} \neq -1\}$. Then the number of elements in the power set of R is:

(A) 32
(B) 16
(C) 8
(D) 64

Answer: (B) 16 · Key from source paper

Q285 JEE Main 2014 · 11 Apr · Online MCQ

Let f be an odd function defined on the set of real numbers such that for $\mathrm{x} \geq 0$, $f(x) = 3\sin x + 4\cos x$. Then $\mathrm{f(x)}$ at $\mathrm{x} = -\frac{11\pi}{6}$ is equal to:

(A) $\frac{3}{2} + 2\sqrt{3}$
(B) $-\frac{3}{2} + 2\sqrt{3}$
(C) $\frac{3}{2} - 2\sqrt{3}$
(D) $-\frac{3}{2} - 2\sqrt{3}$

Answer: (C) $\frac{3}{2} - 2\sqrt{3}$ · Key from source paper

Q286 JEE Main 2014 · 9 Apr · Online MCQ

Let P be the relation defined on the set of all real numbers such that $P = \{(a, b) : \sec^2 a - \tan^2 b = 1\}$. Then, P is

(A) reflexive and symmetric but not transitive
(B) symmetric and transitive but not reflexive
(C) reflexive and transitive but not symmetric
(D) an equivalence relation

Answer: (D) an equivalence relation · Key from source paper

Q287 JEE Main 2014 · 6 Apr · Offline MCQ

If $a \in R$ and the equation $-3(x-[x])^2+2(x-[x])+a^2=0$ (where $[x]$ denotes the greatest integer $\leq x$) has no integral solution, then all possible values of a lie in the interval

(A) $(-2,-1)$
(B) $(-\infty,-2)\cup(2,\infty)$
(C) $(-1,0)\cup(0,1)$
(D) $(1,2)$

Answer: (C) $(-1,0)\cup(0,1)$ · Key from source paper

Q288 JEE Main 2014 · 6 Apr · Offline MCQ

If $X=\{4^n-3n-1 : n\in N\}$ and $Y=\{9(n-1) : n\in N\}$, where N is the set of natural numbers, then $X\cup Y$ is equal to

(A) X
(B) Y
(C) N
(D) $Y-X$

Answer: (B) Y · Key from source paper

Q289 JEE Main 2013 · 23 Apr · Online MCQ

Let R = $\{(x,y) : x,y\in N$ and $x^2-4xy+3y^2=0\}$, where N is the set of all natural numbers. Then the relation R is :

(A) reflexive but neither symmetric nor transitive.
(B) symmetric and transitive.
(C) reflexive and symmetric,
(D) reflexive and transitive.

Answer: (A) reflexive but neither symmetric nor transitive. · Checked by our team

Q290 JEE Main 2013 · 22 Apr · Online MCQ

Let $R=\{(3,3)(5,5),(9,9),(12,12),(5,12),(3,9),(3,12),(3,5)\}$ be a relation on the set $A=\{3,5,9,12\}$. Then, R is :

(A) reflexive, symmetric but not transitive.
(B) symmetric, transitive but not reflexive.
(C) an equivalence relation.
(D) reflexive, transitive but not symmetric.

Answer: (D) reflexive, transitive but not symmetric. · Key from source paper

EdLoop JEE

Q291 JEE Main 2013 · 9 Apr · Online MCQ

Let $A = \{1, 2, 3, 4\}$ and $R : A \to A$ be the relation defined by $R = \{(1, 1), (2, 3), (3, 4), (4, 2)\}$. The correct statement is :

(A) R does not have an inverse.
(B) R is not a one to one function.
(C) R is an onto function.
(D) R is not a function.

Answer: (C) R **is an onto function.** · Key from source paper

Q292 JEE Main 2013 · 7 Apr · Offline MCQ

Let A and B be two sets containing 2 elements and 4 elements respectively. The number of subsets of $A \times B$ having 3 or more elements is :

(A) 219
(B) 211
(C) 256
(D) 220

Answer: (A) 219 · Key from source paper

Q293 AIEEE 2012 · 19 May · Online MCQ

If $P(S)$ denotes the set of all subsets of a given set S, then the number of one-to-one functions from the set $S = \{1, 2, 3\}$ to the set $P(S)$ is

(A) 24
(B) 8
(C) 336
(D) 320

Answer: (C) 336 · Key from source paper

Q294 AIEEE 2012 · 12 May · Online MCQ

If $A = \{x \in z^+ : x < 10$ and x is a multiple of 3 or $4\}$, where $z^+$is the set of positive integers, then the total number of symmetric relations on A is

(A) 2^5
(B) 2^{15}
(C) 2^{10}
(D) 2^{20}

Answer: (B) 2^{15} · Key from source paper

Q295 AIEEE 2012 · 12 May · Online MCQ

Statement 1: If A and B be two sets having p and q elements respectively, where $q > p$. Then the total number of functions from set A to set B is q^p Statement 2: The total number of selections of p different objects out of q objects is ${}^qC_p$.

(A) Statement 1 is true, Statement 2 is false.
(B) Statement 1 is true, Statement 2 is true, Statement 2 is not a correct explanation of Statement 1.
(C) Statement 1 is false, Statement 2 is true
(D) Statement 1 is true, Statement 2 is true, Statement 2 is a correct explanation of Statement 1.

Answer: (B) Statement 1 is true, Statement 2 is true, Statement 2 is not a correct explanation of Statement 1. · Checked by our team

Q296 AIEEE 2012 · 7 May · Online MCQ

The range of the function $f(x) = \frac{x}{1+|x|}, x \in R$, is

(A) R
(B) $(-1, 1)$
(C) $R - \{0\}$
(D) $[-1, 1]$

Answer: (B) $(-1, 1)$ · Key from source paper

Q297 AIEEE 2012 · Offline MCQ

Let $X = \{1, 2, 3, 4, 5\}$. The number of different ordered pairs (Y, Z) that can be formed such that $Y \subseteq X$, $Z \subseteq \mathrm{X}$ and $\mathrm{Y} \cap \mathrm{Z}$ is empty, is

(A) 5^2
(B) 3^5
(C) 2^5
(D) 5^3

Answer: (B) 3^5 · Key from source paper

Q298 AIEEE 2011 MCQ

Let R be the set of real numbers This question has Statement -1 and Statement -2. Of the four choices given after the statements, choose the one that best describes the two statements. Statement-1 : $A = \{(x, y) \in R \times R : y - x \text{ is an integer }\}$ is an equivalence relation on R. Statement-2 : $B = \{(x, y) \in R \times R : x = \alpha y \text{ for some rational number } \alpha\}$ is an equivalence relation on R.

(A) Statement -1 is true, Statement -2 is true; Statement -2 is not a correct explanation for Statement -1

(B) Statement -1 is true, Statement- 2 is false.

(C) Statement -1 is false, Statement -2 is true.

(D) Statement -1 is true, Statement -2 is true; Statement -2 is a correct explanation for Statement -1

Answer: (B) Statement -1 is true, Statement- 2 is false. · Key from source paper

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Q299 AIEEE 2011 MCQ

The domain of the function $f(x) = \frac{1}{\sqrt{|x|-x}}$ is

(A) $(0, \infty)$

(B) $(-\infty, 0)$

(C) $(-\infty, \infty) - \{0\}$

(D) $(-\infty, \infty)$

Answer: (B) $(-\infty, 0)$ · Key from source paper

Q300 AIEEE 2010 MCQ

Consider the following relations: $R = \{(x, y) \mid x, y$ are real numbers and $x = wy$ for some rational number w $\}$; S = \left\{\left(\frac{m}{n}, \frac{p}{q}\right) \mid m, n, p and q are integers such that $n, q \neq 0$ and qm = pn\right\}. Then

(A) neither R nor S is an equivalence relation

(B) S is an equivalence relation but R is not an equivalence relation

(C) R and S both are equivalence relations

(D) R is an equivalence relation but S is not an equivalence relation

Answer: (B) S is an equivalence relation but R is not an equivalence relation · Checked by our team

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Q301 AIEEE 2010 MCQ

Let $f : R \to R$ be a continuous function defined by $f(x) = \frac{1}{e^x + 2e^{-x}}$. Statement-1: $f(c) = \frac{1}{3}$, for some $c \in R$. Statement-2: $0 < f(x) \leq \frac{1}{2\sqrt{2}}$, for all $x \in R$

(A) Statement-1 is true, Statement-2 is true; Statement-2 is not the correct explanation for Statement-1

(B) Statement-1 is true, Statement-2 is false

(C) Statement-1 is false, Statement-2 is true

(D) Statement-1 is true, Statement-2 is true; Statement-2 is the correct explanation for Statement-1

Answer: (D) Statement-1 is true, Statement-2 is true; Statement-2 is the correct explanation for Statement-1 · Key from source paper

Q302 AIEEE 2009 MCQ

If A, B and C are three sets such that $A \cap B = A \cap C$ and $A \cup B = A \cup C$, then

(A) $A = B$
(B) $A = C$
(C) $B = C$
(D) $A \cap B = \phi$

Answer: (C) $B = C$ · Key from source paper

Q303 AIEEE 2009 MCQ

For real x, let $f(x) = x^3 + 5x + 1$, then

(A) f is one-one but not onto R
(B) f is onto R but not one-one
(C) f is one-one and onto R
(D) f is neither one-one nor onto R

Answer: (C) f **is one-one and onto** R · Key from source paper

Q304 AIEEE 2009 MCQ

Let $f(x) = (x+1)^2 - 1, x \geq -1$ Statement-1: The set $\{x : f(x) = f^{-1}(x)\} = \{0, -1\}$ Statement-2 : f is a bijection.

(A) Statement-1 is true, Statement-2 is true; Statement-2 is a correct explanation for Statement-1
(B) Statement-1 is true, Statement-2 is true; Statement-2 is not a correct explanation for Statement-1
(C) Statement-1 is true, Statement-2 is false
(D) Statement-1 is false, Statement-2 is true

Answer: (C) Statement-1 is true, Statement-2 is false · Key from source paper

Q305 AIEEE 2008 MCQ

Let R be the real line. Consider the following subsets of the plane $R \times R$. $S = \{(x, y) : y = x + 1$ and $0 < x < 2\}$, $T = \{(x, y) : x - y$ is an integer $\}$. Which one of the following is true?

(A) neither S nor T is an equivalence relation on R
(B) both S and T are equivalence relations on R
(C) S is an equivalence relation on R but T is not
(D) T is an equivalence relation on R but S is not

Answer: (D) T is an equivalence relation on R but S **is not** · Key from source paper

Q306 AIEEE 2008 MCQ

Let $f : N \to Y$ be a function defined as $f(x) = 4x + 3$, where $Y = \{y \in N : y = 4x + 3$ for some $x \in N\}$. Show that f is invertible and its inverse is

(A) $g(y) = \frac{3y+4}{3}$
(B) $g(y) = 4 + \frac{y+3}{4}$
(C) $g(y) = \frac{y+3}{4}$
(D) $g(y) = \frac{y-3}{4}$

Answer: (D) $g(y) = \frac{y-3}{4}$ · Key from source paper

Q307 AIEEE 2006 MCQ

Let W denote the words in the English dictionary. Define the relation R by : $R = \{(x, y) \in W \times W \mid$ the words x and y have at least one letter in common $\}$. Then R is

(A) not reflexive, symmetric and transitive
(B) reflexive, symmetric and not transitive
(C) reflexive, symmetric and transitive
(D) reflexive, not symmetric and transitive

Answer: (B) reflexive, symmetric and not transitive · Key from source paper

Q308 AIEEE 2005 MCQ

Let $R = \{(3, 3), (6, 6), (9, 9), (12, 12), (6, 12), (3, 9), (3, 12), (3, 6)\}$ be a relation on the set $A = \{3, 6, 9, 12\}$. The relation is

(A) reflexive and transitive only
(B) reflexive only
(C) an equivalence relation
(D) reflexive and symmetric only

Answer: (A) reflexive and transitive only · Key from source paper

Q309 AIEEE 2005 MCQ

A real valued function $f(x)$ satisfies the functional equation $f(x - y) = f(x)f(y) - f(a - x)f(a + y)$ where a is a given constant and $f(0) = 1$, $f(2a - x)$ is equal to

(A) $-f(x)$
(B) $f(x)$
(C) $f(a) + f(a - x)$
(D) $f(-x)$

Answer: (A) $-f(x)$ · Key from source paper

Q310 AIEEE 2004 MCQ

Let $R = \{(1,3),(4,2),(2,4),(2,3),(3,1)\}$ be a relation on the set $A = \{1,2,3,4\}$. The relation R is

(A) a function
(B) reflexive
(C) not symmetric
(D) transitive

Answer: (C) not symmetric · Key from source paper

Q311 AIEEE 2004 MCQ

The range of the function $f(x) = {}^{7-x}P_{x-3}$ is

(A) $\{1,2,3\}$
(B) $\{1,2,3,4,5\}$
(C) $\{1,2,3,4\}$
(D) $\{1,2,3,4,5,6\}$

Answer: (A) $\{1,2,3\}$ · Key from source paper

Q312 AIEEE 2004 MCQ

The graph of the function $y = f(x)$ is symmetrical about the line $x = 2$, then

(A) $f(x+2) = f(x-2)$
(B) $f(2+x) = f(2-x)$
(C) $f(x) = f(-x)$
(D) $f(x) = -f(-x)$

Answer: (B) $f(2+x) = f(2-x)$ · Key from source paper

Q313 AIEEE 2004 MCQ

The domain of the function $f(x) = \frac{\sin^{-1}(x-3)}{\sqrt{9-x^2}}$ is

(A) $[2,3]$
(B) $[2,3)$
(C) $[1,2]$
(D) $[1,2)$

Answer: (B) $[2,3)$ · Key from source paper

Q314 AIEEE 2003 MCQ

The function $f(x) = \log\left(x + \sqrt{x^2+1}\right)$, is

(A) neither an even nor an odd function
(B) an even function
(C) an odd function
(D) a periodic function

Answer: (C) an odd function · Key from source paper

Q315 AIEEE 2003 MCQ

Domain of definition of the function $f(x) = \frac{3}{4-x^2} + \log_{10}\left(x^3 - x\right)$, is

(A) $(-1, 0) \cup (1, 2) \cup (2, \infty)$
(B) $(0, 2)$
(C) $(-1, 0) \cup (0, 2)$
(D) $(1, 2) \cup (2, \infty)$

Answer: (A) $(-1, 0) \cup (1, 2) \cup (2, \infty)$ · Key from source paper

Q316 AIEEE 2003 MCQ

If $f : R \to R$ satisfies $f(x + y) = f(x) + f(y)$, for all $x, y \in R$ and $f(1) = 7$, then $\sum_{r=1}^{n} f(r)$ is

(A) $\frac{7n(n+1)}{2}$
(B) $\frac{7n}{2}$
(C) $\frac{7(n+1)}{2}$
(D) $7n + (n + 1)$

Answer: (A) $\frac{7n(n+1)}{2}$ · Key from source paper

Q317 AIEEE 2003 MCQ

A function f from the set of natural numbers to integers defined by $f(n) = \begin{cases} \frac{n-1}{2}, & \text{when } n \text{ is odd} \\ \frac{n}{2}, & \text{when n is even} \end{cases}$ is

(A) neither one-one nor onto
(B) one-one but not onto
(C) onto but not one-one
(D) one-one and onto both.

Answer: (A) neither one-one nor onto · Checked by our team

Q318 AIEEE 2002 MCQ

The period of $\sin^2\theta$ is

(A) π^2

(B) π

(C) 2π

(D) $\pi/2$

Answer: (B) π · Key from source paper

Q319 AIEEE 2002 MCQ

The domain of $\sin^{-1}[\log_3(x/3)]$ is

(A) [1, 9]

(B) [-1,9]

(C) [-9, 1]

(D) [-9, -1]

Answer: (A) [1, 9] · Key from source paper

Q320 AIEEE 2002 MCQ

Which one is not periodic

(A) $|\sin 3x| + \sin^2 x$

(B) $\cos\sqrt{x} + \cos^2 x$

(C) $\cos 4x + \tan^2 x$

(D) $\cos 2x + \sin x$

Answer: (B) $\cos\sqrt{x} + \cos^2 x$ · Key from source paper

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Q321 AIEEE 2002 MCQ

If $f(x+y) = f(x)\cdot f(y) \forall x \cdot y$ and $f(5) = 2, f'(0) = 3$ then $f'(5)$ is

(A) 0

(B) 1

(C) 6

(D) 2

Answer: (C) 6 · Key from source paper

EdLoop JEE