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MATHEMATICS · JEE MAIN

Complex Numbers

Previous Year Questions with answers

215 questions · **185** papers · **2002–2026** · newest paper first

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What is in this PDF: every Complex Numbers 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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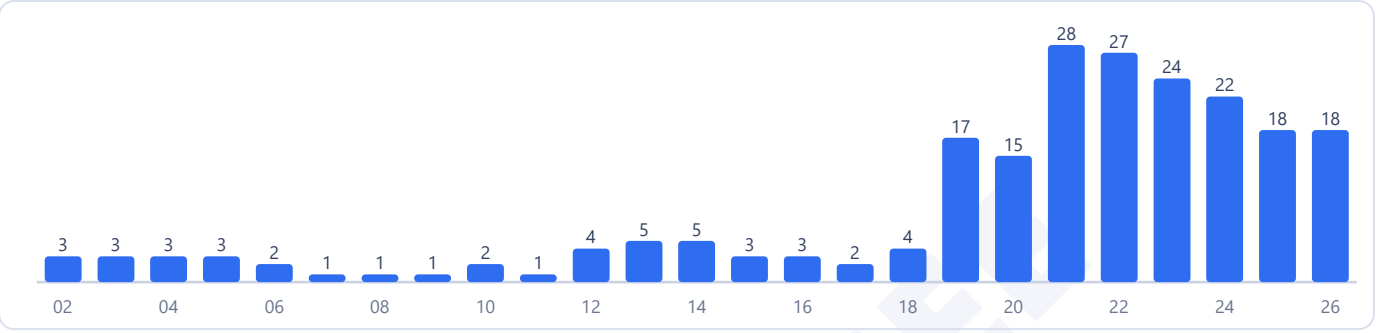
Chapter at a glance

3.7%	215	149 of 162	178 / 37
of Mathematics questions, 2019–2026	questions, 2002–2026	papers asked it, 2019–2026	MCQ / numerical, 2002–2026

Trend. Steady: 1 questions per paper in 2024–2026 against 1.1 in 2019–2023.

Questions per year



Counts are the questions we hold: 215 in 185 papers. No question in this chapter was found repeated across papers.

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

Geometry of Complex Numbers	97
Algebra of Complex Numbers	81
De Moivre's Theorem & Roots of Unity	37

How often it comes up

Complex numbers unites algebra with Argand plane coordinate geometry under Unit 2: Complex Numbers and Quadratic Equations in the Class 11 curriculum, holding rank 14 of 29 chapters with a 3.7% share of the mathematics section. During the 2019 to 2026 test timeframe, Complex Numbers contributed 169 questions across 162 exam papers, making up 3.7% of the mathematics section and holding rank 14 of 29 chapters. In the earlier 2002 to 2018 testing period, it registered 46 questions across 38 papers with a 3.5% share. Over the recent 2024 to 2026 seasons, the chapter yielded 58 questions across 58 papers, accounting for a 3.7% share. Comparing both earlier time windows against 2024 to 2026, its testing share has remained about the same.

The chapter has appeared every year from 2019 to 2026. Students met an average of 1.0 question per paper across 2019 to 2026, matching the 1.0 question per paper observed between 2024 and 2026. A substantial 37 numerical answer questions were set between 2019 and 2026, often requiring calculation of maximum distances or sum of squared moduli.

Most-asked topics

The syllabus organizes into three core topics:

- Geometry of Complex Numbers: The largest topic with 97 total questions (79 in 2019 to 2026), evaluated continuously through 2026. Core concepts evaluate loci of z in the Argand plane: circles given by |z - z0| = r, perpendicular bisectors from |z - z1| = |z - z2|, Apollonius circles from |z - z1| / |z - z2| = k, triangle inequality extrema, and minimum/maximum distances between circles and lines.
- Algebra of Complex Numbers: Produced 81 total questions (61 in 2019 to 2026), tested through 2026. Focuses on algebraic simplification, equating real and imaginary components, modulus-conjugate identities (|z|^2 = z z-bar), square roots of complex numbers, and purely real or imaginary constraints.

- De Moivre's Theorem & Roots of Unity: Accounted for 37 total questions (29 in 2019 to 2026), active through 2026. Evaluates non-real cube roots of unity (1 + omega + omega^2 = 0, omega^3 = 1), nth roots of unity, and integer powers evaluated using polar trigonometric forms.

What the questions look like

Examiners test geometric intuition alongside algebraic substitution. A very common pattern defines a circle or disk in the Argand plane, such as |z - z0| <= r, and asks for the point with the largest argument or the maximum value of an expression |z - w|.

In algebra and roots of unity, questions frequently set up quadratic equations like x^2 + x + 1 = 0 whose roots are omega and omega^2, then ask candidates to evaluate high-power polynomial sums or matrix determinants constructed from powers of omega.

How to practise it

Prepare for complex numbers by mastering both algebraic manipulation and geometric interpretation:

1. Think geometrically before substituting z = x + iy: Always identify whether an equation represents a circle (|z - z0| = r), perpendicular bisector (|z - z1| = |z - z2|), or ellipse (|z - z1| + |z - z2| = 2a). 2. Master triangle inequalities: | |z1| - |z2| | <= |z1 + z2| <= |z1| + |z2|. Use this directly to find maximum and minimum distances without multivariable calculus. 3. Master cube roots of unity identities: Remember that 1 + omega + omega^2 = 0 and omega^3 = 1. Also recognize that -omega and -omega^2 are roots of x^2 - x + 1 = 0. 4. Exploit conjugate properties: z is purely real if and only if z = z-bar; z is purely imaginary if and only if z = -z-bar. 5. Practise converting to polar form: Write z = r(cos theta + i sin theta) = r e^(i theta) when evaluating fractional powers or high integer exponents via De Moivre's theorem.

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Q1 JEE Main 2026 · 8 Apr · Shift 2 MCQ

The number of values of $z \in \mathbb{C}$, satisfying the equations $|z-(4+8i)|=\sqrt{10}$ and $|z-(3+5i)|+|z-(5+11i)|=4\sqrt{5}$, is :

(A) 0
(B) 2
(C) 1
(D) 4

Answer: (B) 2 · Official NTA final key

Q2 JEE Main 2026 · 6 Apr · Shift 1 MCQ

Let the set of all values of $k \in \mathbb{R}$ such that the equation $z(\bar{z}+2+i)+k(2+3i)=0$, $z \in \mathbb{C}$, has at least one solution, be the interval $[\alpha, \beta]$. Then $9(\alpha+\beta)$ is equal to:

(A) -10
(B) -8
(C) $10\sqrt{13}$
(D) $8\sqrt{13}$

Answer: (A) -10 · Official NTA final key

Q3 JEE Main 2026 · 6 Apr · Shift 2 MCQ

Let $S=\{z \in \mathbb{C} : z^2+\sqrt{6}\,iz-3=0\}$. Then $\sum_{z \in S} z^8$ is equal to :

(A) 162
(B) 184
(C) 262
(D) 324

Answer: (A) 162 · Official NTA final key

Q4 JEE Main 2026 · 5 Apr · Shift 2 MCQ

Let $z_1, z_2 \in \mathbf{C}$ be the distinct solutions of the equation $z^2+4z-(1+12i)=0$. Then $|z_1|^2+|z_2|^2$ is equal to :

(A) 18
(B) 22
(C) 29
(D) 34

Answer: (D) 34 · Official NTA final key

Q5 JEE Main 2026 · 4 Apr · Shift 1 MCQ

Let z be a complex number such that $|z+2| = |z-2|$ and $\arg\left(\frac{z+3}{z-i}\right) = \frac{\pi}{4}$. Then $|z|^2$ is equal to:

(A) 9
(B) 4
(C) 5
(D) 1

Answer: (A) 9 · Official NTA final key

Q6 JEE Main 2026 · 4 Apr · Shift 2 MCQ

Let $S = \{z \in \mathbb{C} : z^2 + 4z + 16 = 0\}$. Then $\sum_{z \in S} \left|z + \sqrt{3}\,i\right|^2$ is equal to:

(A) 42
(B) 23
(C) 27
(D) 38

Answer: (D) 38 · Official NTA final key

Q7 JEE Main 2026 · 2 Apr · Shift 1 MCQ

Let x and y be real numbers such that $50\left(\frac{2x}{1+3i} - \frac{y}{1-2i}\right) = 31 + 17i$, $i = \sqrt{-1}$. Then the value of $10(x-3y)$ is :

(A) 20
(B) 31
(C) 35
(D) 75

Answer: (D) 75 · Official NTA final key

Q8 JEE Main 2026 · 2 Apr · Shift 2 MCQ

Let the circles $C_1 : |z| = r$ and $C_2 : |z-3-4i| = 5$, $z \in \mathbb{C}$, be such that C_2 lies within C_1. If z_1 moves on C_1, z_2 moves on C_2 and $\min|z_1 - z_2| = 2$, then $\max|z_1 - z_2|$ is equal to :

(A) 12
(B) 17
(C) 22
(D) 24

Answer: (C) 22 · Official NTA final key

Q9 JEE Main 2026 · 28 Jan · Shift 1 MCQ

Let z be a complex number such that $|z-6|=5$ and $|z+2-6i|=5$. Then the value of $z^3+3z^2-15z+141$ is equal to

(A) 37
(B) 42
(C) 50
(D) 61

Answer: (C) 50 · Official NTA final key

Q10 JEE Main 2026 · 28 Jan · Shift 2 MCQ

Let

$\mathrm{A}=\{z\in\mathbb{C}:|z-2|\le 4\}$ and

$\mathrm{B}=\{z\in\mathbb{C}:|z-2|+|z+2|=5\}$.

Then the max $\{|z_1-z_2|:z_1\in\mathrm{A}$ and $z_2\in\mathrm{B}\}$ is :

(A) 8
(B) $\frac{15}{2}$
(C) 9
(D) $\frac{17}{2}$

Answer: (D) $\frac{17}{2}$ · Official NTA final key

Q11 JEE Main 2026 · 24 Jan · Shift 1 MCQ

Let $\mathrm{S}=\left\{z\in\mathbb{C}:\left|\frac{z-6i}{z-2i}\right|=1 \text{ and } \left|\frac{z-8+2i}{z+2i}\right|=\frac{3}{5}\right\}$.

Then $\sum_{z\in\mathrm{S}}|z|^2$ is equal to

(A) 398
(B) 385
(C) 423
(D) 413

Answer: (B) 385 · Official NTA final key

Q12 JEE Main 2026 · 24 Jan · Shift 2 Numerical

Let $z=(1+i)(1+2i)(1+3i)\ldots(1+ni)$, where $i=\sqrt{-1}$. If $|z|^2=44200$, then n is equal to _____.

Numerical value type: the answer is a number.

Answer: 5. · Official NTA final key

Q13 JEE Main 2026 · 23 Jan · Shift 1 MCQ

Let $S = \{z : 3 \le |2z - 3(1+i)| \le 7\}$ be a set of complex numbers.

Then $\min_{z \in S} \left| \left(z + \frac{1}{2}(5+3i) \right) \right|$ is equal to :

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

Answer: (B) $\frac{3}{2}$ · Official NTA final key

Q14 JEE Main 2026 · 23 Jan · Shift 2 MCQ

If $z = \frac{\sqrt{3}}{2} + \frac{i}{2}$, $i = \sqrt{-1}$, then $\left(z^{201} - i\right)^8$ is equal to

(A) 0
(B) 256
(C) -1
(D) 1

Answer: (B) 256 · Official NTA final key

Q15 JEE Main 2026 · 22 Jan · Shift 1 Numerical

Let $\alpha = \frac{-1 + i\sqrt{3}}{2}$ and $\beta = \frac{-1 - i\sqrt{3}}{2}$, $i = \sqrt{-1}$. If

$(7 - 7\alpha + 9\beta)^{20} + (9 + 7\alpha - 7\beta)^{20} + (-7 + 9\alpha + 7\beta)^{20} + (14 + 7\alpha + 7\beta)^{20} = m^{10}$,

then m is _____.

Numerical value type: the answer is a number.

Answer: 49. · Official NTA final key

Q16 JEE Main 2026 · 22 Jan · Shift 2 MCQ

Let $S = \{z \in \mathbb{C} : 4z^2 + \bar{z} = 0\}$. Then $\sum_{z \in S} |z|^2$ is equal to :

(A) $\frac{1}{16}$
(B) $\frac{3}{16}$
(C) $\frac{5}{64}$
(D) $\frac{7}{64}$

Answer: (B) $\frac{3}{16}$ · Official NTA final key

Q17 JEE Main 2026 · 21 Jan · Shift 1 MCQ

If $x^2+x+1=0$, then the value of $\left(x+\frac{1}{x}\right)^4+\left(x^2+\frac{1}{x^2}\right)^4+\left(x^3+\frac{1}{x^3}\right)^4+\ldots+\left(x^{25}+\frac{1}{x^{25}}\right)^4$ is :

(A) 128
(B) 175
(C) 145
(D) 162

Answer: (C) 145 · Official NTA final key

Q18 JEE Main 2026 · 21 Jan · Shift 2 MCQ

Let z be the complex number satisfying $|z-5|\leq 3$ and having maximum positive principal argument. Then $34\left|\frac{5z-12}{5iz+16}\right|^2$ is equal to :

(A) 12
(B) 16
(C) 26
(D) 20

Answer: (D) 20 · Official NTA final key

Q19 JEE Main 2025 · 8 Apr · Shift 2 MCQ

Let $A=\left\{\theta\in[0,2\pi]: 1+10\ \mathrm{Re}\left(\frac{2\cos\theta+i\sin\theta}{\cos\theta-3i\sin\theta}\right)=0\right\}$. Then $\sum_{\theta\in A}\theta^2$ is equal to

(A) $\frac{27}{4}\pi^2$
(B) $6\pi^2$
(C) $8\pi^2$
(D) $\frac{21}{4}\pi^2$

Answer: (D) $\frac{21}{4}\pi^2$ · Key from source paper

Q20 JEE Main 2025 · 8 Apr · Shift 2 MCQ

Let α be a solution of $x^2+x+1=0$, and for some a and b in $\mathbb{R}$, $\begin{bmatrix}4 & a & b\end{bmatrix}\begin{bmatrix}1 & 16 & 13\\ -1 & -1 & 2\\ -2 & -14 & -8\end{bmatrix}=\begin{bmatrix}0 & 0 & 0\end{bmatrix}$. If $\frac{4}{\alpha^4}+\frac{m}{\alpha^a}+\frac{n}{\alpha^b}=3$, then $m+n$ is equal to _____.

(A) 11
(B) 3
(C) 7
(D) 8

Answer: (A) 11 · Key from source paper

Q21 JEE Main 2025 · 7 Apr · Shift 1 MCQ

Among the statements

(S1) : The set $\{z \in \mathbb{C} - \{-i\} : |z| = 1 \text{ and } \frac{z-i}{z+i} \text{ is purely real}\}$ contains exactly two elements, and

(S2) : The set $\{z \in \mathbb{C} - \{-1\} : |z| = 1 \text{ and } \frac{z-1}{z+1} \text{ is purely imaginary}\}$ contains infinitely many elements.

(A) both are correct
(B) only (S2) is correct
(C) only (S1) is correct
(D) both are incorrect

Answer: (B) only (S2) is correct · Key from source paper

Q22 JEE Main 2025 · 7 Apr · Shift 2 MCQ

If the locus of $z \in \mathbb{C}$, such that $\text{Re}\left(\frac{z-1}{2z+i}\right) + \text{Re}\left(\frac{\bar{z}-1}{2\bar{z}-i}\right) = 2$, is a circle of radius r and center (a,b), then $\frac{15ab}{r^2}$ is equal to :

(A) 24
(B) 18
(C) 16
(D) 12

Answer: (B) 18 · Key from source paper

Q23 JEE Main 2025 · 4 Apr · Shift 1 Numerical

Let $A = \{z \in \mathbb{C} : |z - 2 - i| = 3\}, B = \{z \in \mathbb{C} : \text{Re}(z - iz) = 2\}$ and $S = A \cap B$. Then $\sum_{z \in S} |z|^2$ is equal to _____

Numerical value type: the answer is a number.

Answer: 22. · Key from source paper

Q24 JEE Main 2025 · 4 Apr · Shift 2 MCQ

Let the product of $\omega_1 = (8 + i)\sin\theta + (7 + 4i)\cos\theta$ and $\omega_2 = (1 + 8i)\sin\theta + (4 + 7i)\cos\theta$ be $\alpha + i\beta$, $i = \sqrt{-1}$. Let p and q be the maximum and the minimum values of $\alpha + \beta$ respectively. Then $p + q$ is equal to :

(A) 150
(B) 160
(C) 140
(D) 130

Answer: (D) 130 · Key from source paper

Q25 JEE Main 2025 · 4 Apr · Shift 2 · Numerical

If α is a root of the equation $x^2 + x + 1 = 0$ and $\sum_{k=1}^{n} \left(\alpha^k + \frac{1}{\alpha^k}\right)^2 = 20$, then n is equal to _____ .

Numerical value type: the answer is a number.

Answer: 11. · Key from source paper

Q26 JEE Main 2025 · 3 Apr · Shift 1 · MCQ

Let $z \in \mathbb{C}$ be such that $\frac{z^2+3i}{z-2+i} = 2 + 3i$. Then the sum of all possible values of z^2 is

(A) $-19 + 2i$
(B) $19 - 2i$
(C) $-19 - 2i$
(D) $19 + 2i$

Answer: (C) $-19 - 2i$ · Key from source paper

Q27 JEE Main 2025 · 3 Apr · Shift 2 · MCQ

If $z_1, z_2, z_3 \in \mathbb{C}$ are the vertices of an equilateral triangle, whose centroid is z_0, then $\sum_{k=1}^{3}(z_k - z_0)^2$ is equal to

(A) 0
(B) i
(C) -i
(D) 1

Answer: (A) 0 · Key from source paper

Q28 JEE Main 2025 · 2 Apr · Shift 1 · MCQ

Let z be a complex number such that $|z| = 1$. If $\frac{2+k^2z}{k+\bar{z}} = kz, k \in R$, then the maximum distance of $k + ik^2$ from the circle $|z - (1 + 2i)| = 1$ is :

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(A) $\sqrt{5}+1$
(B) $\sqrt{3}+1$
(C) 3
(D) 2

Answer: (A) $\sqrt{5}+1$ · Key from source paper

Q29 JEE Main 2025 · 29 Jan · Shift 1 MCQ

Let $|z_1 - 8 - 2\mathrm{i}| \leq 1$ and $|z_2 - 2 + 6\mathrm{i}| \leq 2$, $z_1, z_2 \in \mathbf{C}$. Then the minimum value of $|z_1 - z_2|$ is :

(A) 13
(B) 10
(C) 3
(D) 7

Answer: (D) 7 · Key from source paper

Q30 JEE Main 2025 · 29 Jan · Shift 2 Numerical

Let integers a, b $\in [-3, 3]$ be such that a + b $\neq 0$. Then the number of all possible ordered pairs (a, b), for which $\left|\frac{z-\mathrm{a}}{z+\mathrm{b}}\right| = 1$ and $\begin{vmatrix} z+1 & \omega & \omega^2 \\ \omega & z+\omega^2 & 1 \\ \omega^2 & 1 & z+\omega \end{vmatrix} = 1$, $z \in \mathbf{C}$, where ω and ω^2 are the roots of $x^2 + x + 1 = 0$, is equal to _____ .

Numerical value type: the answer is a number.

Answer: 10. · Key from source paper

Q31 JEE Main 2025 · 28 Jan · Shift 1 MCQ

Let O be the origin, the point A be $z_1 = \sqrt{3} + 2\sqrt{2}i$, the point $B(z_2)$ be such that $\sqrt{3}\,|z_2| = |z_1|$ and $\arg(z_2) = \arg(z_1) + \frac{\pi}{6}$. Then

(A) area of triangle ABO is $\frac{11}{\sqrt{3}}$
(B) ABO is an obtuse angled isosceles triangle
(C) area of triangle ABO is $\frac{11}{4}$
(D) ABO is a scalene triangle

Answer: (B) ABO is an obtuse angled isosceles triangle · Key from source paper

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Q32 JEE Main 2025 · 28 Jan · Shift 2 MCQ

If $\alpha + i\beta$ and $\gamma + i\delta$ are the roots of $x^2 - (3 - 2i)x - (2i - 2) = 0$, $i = \sqrt{-1}$, then $\alpha\gamma + \beta\delta$ is equal to :

(A) -2
(B) 6
(C) -6
(D) 2

Answer: (D) 2 · Key from source paper

Q33 JEE Main 2025 · 23 Jan · Shift 1 MCQ

Let $\left|\frac{\bar{z}-i}{2\bar{z}+i}\right| = \frac{1}{3}$, $z \in C$, be the equation of a circle with center at C. If the area of the triangle, whose vertices are at the points $(0, 0)$, C and $(\alpha, 0)$ is 11 square units, then α^2 equals:

(A) 50
(B) 100
(C) $\frac{81}{25}$
(D) $\frac{121}{25}$

Answer: (B) 100 · Key from source paper

Q34 JEE Main 2025 · 23 Jan · Shift 2 MCQ

The number of complex numbers z, satisfying $|z| = 1$ and $\left|\frac{z}{\bar{z}} + \frac{\bar{z}}{z}\right| = 1$, is :

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

Answer: (B) 8 · Key from source paper

Q35 JEE Main 2025 · 22 Jan · Shift 1 MCQ

Let z_1, z_2 and z_3 be three complex numbers on the circle $|z| = 1$ with $\arg(z_1) = \frac{-\pi}{4}$, $\arg(z_2) = 0$ and $\arg(z_3) = \frac{\pi}{4}$. If $|z_1\bar{z}_2 + z_2\bar{z}_3 + z_3\bar{z}_1|^2 = \alpha + \beta\sqrt{2}$, $\alpha, \beta \in \mathbf{Z}$, then the value of $\alpha^2 + \beta^2$ is :

(A) 24
(B) 29
(C) 41
(D) 31

Answer: (B) 29 · Key from source paper

Q36 JEE Main 2025 · 22 Jan · Shift 2 MCQ

Let the curve $z(1+i) + \bar{z}(1-i) = 4$, $z \in \mathrm{C}$, divide the region $|z-3| \leq 1$ into two parts of areas α and β. Then $|\alpha - \beta|$ equals :

(A) $1+\frac{\pi}{2}$
(B) $1+\frac{\pi}{3}$
(C) $1+\frac{\pi}{6}$
(D) $1+\frac{\pi}{4}$

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

Q37 JEE Main 2024 · 9 Apr · Shift 1 Numerical

The sum of the square of the modulus of the elements in the set $\{z=\mathrm{a}+\mathrm{ib}:\mathrm{a},\mathrm{b}\in\mathbf{Z},z\in\mathbf{C},|z-1|\leq 1,|z-5|\leq|z-5\mathrm{i}|\}$ is _____

Numerical value type: the answer is a number.

Answer: 9. · Key from source paper

Q38 JEE Main 2024 · 9 Apr · Shift 2 MCQ

Let z be a complex number such that the real part of $\frac{z-2i}{z+2i}$ is zero. Then, the maximum value of $|z-(6+8i)|$ is equal to

(A) 12
(B) 10
(C) 8
(D) ∞

Answer: (A) 12 · Key from source paper

Q39 JEE Main 2024 · 8 Apr · Shift 1 MCQ

Let z be a complex number such that $|z+2|=1$ and $\mathrm{Im}\left(\frac{z+1}{z+2}\right)=\frac{1}{5}$. Then the value of $|\mathrm{Re}(\overline{z+2})|$ is

(A) $\frac{2\sqrt{6}}{5}$
(B) $\frac{24}{5}$
(C) $\frac{1+\sqrt{6}}{5}$
(D) $\frac{\sqrt{6}}{5}$

Answer: (A) $\frac{2\sqrt{6}}{5}$ · Key from source paper

Q40 JEE Main 2024 · 8 Apr · Shift 1 MCQ

If the set $R=\{(a,b):a+5b=42,a,b\in\mathbb{N}\}$ has m elements and $\sum_{n=1}^{m}\left(1-i^{n!}\right)=x+iy$, where $i=\sqrt{-1}$, then the value of $m+x+y$ is

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(A) 12
(B) 4
(C) 8
(D) 5

Answer: (A) 12 · Key from source paper

Q41 JEE Main 2024 · 6 Apr · Shift 2 MCQ

If z_1, z_2 are two distinct complex number such that $\left|\frac{z_1-2z_2}{\frac{1}{2}-z_1\bar{z}_2}\right| = 2$, then

(A) z_1 lies on a circle of radius $\frac{1}{2}$ and z_2 lies on a circle of radius 1 .
(B) both z_1 and z_2 lie on the same circle. both z_1 and z_2 lie on the same circle.
(C) either z_1 lies on a circle of radius $\frac{1}{2}$ or z_2 lies on a circle of radius 1 .
(D) either z_1 lies on a circle of radius 1 or z_2 lies on a circle of radius $\frac{1}{2}$.

Answer: (D) either z_1 lies on a circle of radius 1 or z_2 lies on a circle of radius $\frac{1}{2}$. · Key from source paper

Q42 JEE Main 2024 · 5 Apr · Shift 1 MCQ

Consider the following two statements : Statement I : For any two non-zero complex numbers z_1, z_2, $(|z_1|+|z_2|)\left|\frac{z_1}{|z_1|}+\frac{z_2}{|z_2|}\right| \leq 2(|z_1|+|z_2|)$, and Statement II : If x, y, z are three distinct complex numbers and a, b, c are three positive real numbers such that $\frac{a}{|y-z|} = \frac{b}{|z-x|} = \frac{c}{|x-y|}$, then $\frac{a^2}{y-z}+\frac{b^2}{z-x}+\frac{c^2}{x-y} = 1$. Between the above two statements,

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

Answer: (A) Statement I is correct but Statement II is incorrect. · Key from source paper

Q43 JEE Main 2024 · 5 Apr · Shift 2 MCQ

Let $S_1 = \{z \in C : |z| \leq 5\}, S_2 = \left\{z \in C : \operatorname{Im}\left(\frac{z+1-\sqrt{3}i}{1-\sqrt{3}i}\right) \geq 0\right\}$ and $S_3 = \{z \in C : \operatorname{Re}(z) \geq 0\}$. Then the area of the region $S_1 \cap S_2 \cap S_3$ is :

(A) $\frac{125\pi}{12}$
(B) $\frac{125\pi}{4}$
(C) $\frac{125\pi}{24}$
(D) $\frac{125\pi}{6}$

Answer: (A) $\frac{125\pi}{12}$ · Key from source paper

Q44 JEE Main 2024 · 4 Apr · Shift 1 MCQ

Let α and β be the sum and the product of all the non-zero solutions of the equation $(\bar{z})^2 + |z| = 0, z \in \mathbb{C}$. Then $4\left(\alpha^2 + \beta^2\right)$ is equal to :

(A) 6
(B) 8
(C) 2
(D) 4

Answer: (D) 4 · Key from source paper

Q45 JEE Main 2024 · 4 Apr · Shift 2 MCQ

The area (in sq. units) of the region $S = \{z \in \mathbb{C} : |z-1| \leq 2; (z+\bar{z}) + i(z-\bar{z}) \leq 2, \text{Im}(z) \geq 0\}$ is

(A) $\frac{7\pi}{3}$
(B) $\frac{7\pi}{4}$
(C) $\frac{17\pi}{8}$
(D) $\frac{3\pi}{2}$

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

Q46 JEE Main 2024 · 1 Feb · Shift 1 MCQ

Let $S = z \in C : z - 1 = 1$ and $\sqrt{2} - 1z + \bar{z} - iz - \bar{z} = 2\sqrt{2}$. Let $z_1, z_2 \in S$ be such that $z_1 = \max_{z \in S} z$ and $z_2 = \min_{z \in S} z$. Then $\sqrt{2}z_1 - z_2^2$ equals:

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

Answer: (D) 2 · Key from source paper

Q47 JEE Main 2024 · 1 Feb · Shift 1 Numerical

Let $P = z \in \mathbb{C} : z + 2 - 3i \leq 1$ and $Q = z \in \mathbb{C} : z1 + i + \bar{z}1 - i \leq -8$. Let in $P \cap Q, z - 3 + 2i$ be maximum and minimum at z_1 and z_2 respectively. If $z_1^2 + 2z^2 = \alpha + \beta\sqrt{2}$, where α, β are integers, then $\alpha + \beta$ equals

Numerical value type: the answer is a number.

Answer: 36. · Key from source paper

Q48 JEE Main 2024 · 1 Feb · Shift 2 MCQ

If z is a complex number such that $z \leq 1$, then the minimum value of $z + \frac{1}{2}3 + 4i$ is:

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

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

Q49 JEE Main 2024 · 31 Jan · Shift 1 · Numerical

If α denotes the number of solutions of $1 - i^x = 2^x$ and $\beta = \frac{z}{\arg z}$, where $z = \frac{\pi}{4}1 + i^4\frac{1-\sqrt{\pi}\cdot i}{\sqrt{\pi}+i} + \frac{\sqrt{\pi}-i}{1+\sqrt{\pi}\cdot i}$, $i = \sqrt{-1}$, then the distance of the point $\alpha,\ \beta$ from the line $4x - 3y = 7$ is _____.

Numerical value type: the answer is a number.

Answer: 3. · Key from source paper

Q50 JEE Main 2024 · 31 Jan · Shift 2 · MCQ

Let z_1 and z_2 be two complex number such that $z_1 + z_2 = 5$ and $z_1^3 + z_2^3 = 20 + 15i$. Then $z_1^4 + z_2^4$ equals-

(A) $30\sqrt{3}$
(B) 75
(C) $15\sqrt{15}$
(D) $25\sqrt{3}$

Answer: (B) 75 · Key from source paper

Q51 JEE Main 2024 · 30 Jan · Shift 1 · MCQ

If $z = x + iy$, $xy \neq 0$, satisfies the equation $z^2 + i\bar{z} = 0$, then $|z^2|$ is equal to :

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

Answer: (B) 1 · Key from source paper

Q52 JEE Main 2024 · 30 Jan · Shift 2 · MCQ

If z is a complex number, then the number of common roots of the equation $z^{1985} + z^{100} + 1 = 0$ and $z^3 + 2z^2 + 2z + 1 = 0$, is equal to :

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(A) 1
(B) 2
(C) 0
(D) 3

Answer: (B) 2 · Key from source paper

Q53 JEE Main 2024 · 29 Jan · Shift 1 MCQ

If $z = \frac{1}{2} - 2i$, is such that $|z+1| = \alpha z + \beta(1+i)$, $i = \sqrt{-1}$ and $\alpha, \beta \in \mathrm{R}$, then $\alpha + \beta$ is equal to

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

Answer: (B) 3 · Key from source paper

Q54 JEE Main 2024 · 29 Jan · Shift 2 MCQ

Let r and θ respectively be the modulus and amplitude of the complex number $z = 2 - i\left(2\tan\frac{5\pi}{8}\right)$, then (r, θ) is equal to

(A) $\left(2\sec\frac{3\pi}{8}, \frac{3\pi}{8}\right)$
(B) $\left(2\sec\frac{3\pi}{8}, \frac{5\pi}{8}\right)$
(C) $\left(2\sec\frac{5\pi}{8}, \frac{3\pi}{8}\right)$
(D) $\left(2\sec\frac{11\pi}{8}, \frac{11\pi}{8}\right)$

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

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Q55 JEE Main 2024 · 29 Jan · Shift 2 Numerical

Let α, β be the roots of the equation $x^2 - \sqrt{6}x + 3 = 0$ such that $\mathrm{Im}(\alpha) > \mathrm{Im}(\beta)$. Let $a,\ b$ be integers not divisible by 3 and n be a natural number such that $\frac{\alpha^{99}}{\beta} + \alpha^{98} = 3^n(a+ib)$, $i = \sqrt{-1}$. Then $n + a + b$ is equal to _____.

Numerical value type: the answer is a number.

Answer: 49. · Key from source paper

Q56 JEE Main 2024 · 27 Jan · Shift 1 MCQ

If $S = z \in C : |z-i| = |z+i| = |z-1|$, then, n(S) is:

(A) 1
(B) 0
(C) 3
(D) 2

Answer: (A) 1 · Key from source paper

Q57 JEE Main 2024 · 27 Jan · Shift 1 Numerical

If α satisfies the equation $x^2+x+1=0$ and $(1+\alpha)^7 = A+B\alpha+C\alpha^2$, A, B, C ≥ 0, then $5(3\,A-2\,B-C)$ is equal to

Numerical value type: the answer is a number.

Answer: 5. · Key from source paper

Q58 JEE Main 2024 · 27 Jan · Shift 2 Numerical

Let the complex numbers α and $\frac{1}{\bar{\alpha}}$ lie on the circles $z-z_0^2=4$ and $z-z_0^2=16$ respectively, where $z_0=1+i$. Then, the value of $100\,|\alpha|^2$ is _____.

Numerical value type: the answer is a number.

Answer: 20. · Key from source paper

Q59 JEE Main 2023 · 15 Apr · Shift 1 MCQ

If the set $\left\{Re\left(\frac{z-\bar{z}+z\bar{z}}{2-3z+5\bar{z}}\right) : z\in\mathbb{C},\ Re\,z=3\right\}$ is equal to the interval $(\alpha,\beta]$, then $24(\beta-\alpha)$ is equal to

(A) 36
(B) 27
(C) 30
(D) 42

Answer: (C) 30 · Key from source paper

Q60 JEE Main 2023 · 13 Apr · Shift 1 Numerical

Let $w=z\bar{z}+k_1z+k_2iz+\lambda(1+i)$, $k_1,k_2\in\mathbb{R}$. Let $Re(w)=0$ be the circle C of radius 1 in the first quadrant touching the line $y=1$ and the y-axis. If the curve $Im(w)=0$ intersects C at A and B, then $30(AB)^2$ is equal to _____.

Numerical value type: the answer is a number.

Answer: 24. · Key from source paper

Q61 JEE Main 2023 · 13 Apr · Shift 2 MCQ

Let $S=z\in\mathbb{C}:\bar{z}=iz^2+\mathrm{Re}\,(\bar{z})$. Then $\sum_{z\in S}|z|^2$ is equal to

(A) $\frac{5}{2}$
(B) 4
(C) $\frac{7}{2}$
(D) 3

Answer: (B) 4 · Key from source paper

Q62 JEE Main 2023 · 12 Apr · Shift 1 MCQ

Let C be the circle in the complex plane with centre $z_0 = \frac{1}{2}(1+3i)$ and radius $r = 1$. Let $z_1 = 1+i$ and the complex number z_2 be outside circle C such that $|z_1 - z_0||z_2 - z_0| = 1$. If z_0, z_1 and z_2 are collinear, then the smaller value of $|z_2|^2$ is equal to

(A) $\frac{5}{2}$
(B) $\frac{7}{2}$
(C) $\frac{13}{2}$
(D) $\frac{3}{2}$

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

Q63 JEE Main 2023 · 11 Apr · Shift 1 MCQ

Let w_1 be the point obtained by the rotation of $z_1 = 5+4i$ about the origin through a right angle in the anticlockwise direction, and w_2 be the point obtained by the rotation of $z_2 = 3+5i$ about the origin through a right angle in the clockwise direction. Then the principal argument $w_1 - w_2$ is equal to

(A) $\pi - \tan^{-1}\frac{8}{9}$
(B) $-\pi + \tan^{-1}\frac{33}{5}$
(C) $-\pi + \tan^{-1}\frac{8}{9}$
(D) $\pi - \tan^{-1}\frac{33}{5}$

Answer: (A) $\pi - \tan^{-1}\frac{8}{9}$ · Key from source paper

Q64 JEE Main 2023 · 11 Apr · Shift 2 MCQ

For $a \in \mathbb{C}$, let $A = \{z \in \mathbb{C} : \mathrm{Re}\,(a+\bar{z}) > \mathrm{Im}\,(\bar{a}+z)\}$ and $B = \{z \in \mathbb{C} : \mathrm{Re}\,(a+z) < \mathrm{Im}\,(\bar{a}+z)\}$. Then among the two statements:
$(S1)$: If $\mathrm{Re}\,(a), \mathrm{Im}\,(a) > 0$, then the set A contains all the real numbers
$(S2)$: If $\mathrm{Re}\,(a), \mathrm{Im}\,(a) < 0$, then the set B contains all the real numbers,

(A) Only $(S2)$ is true
(B) only $(S1)$ is true
(C) Both are true
(D) Both are false

Answer: (D) Both are false · Key from source paper

Q65 JEE Main 2023 · 11 Apr · Shift 2 · Numerical

Let $S = \left\{z \in \mathbb{C} - \{i, 2i\} : \frac{z^2+8iz-15}{z^2-3iz-2} \in \mathbb{R}\right\}$. $\alpha - \frac{13}{11}i \in S$, $\alpha \in \mathbb{R} - \{0\}$, then $242\alpha^2$ is equal to _____

Numerical value type: the answer is a number.

Answer: 1680. · Key from source paper

Q66 JEE Main 2023 · 10 Apr · Shift 1 · MCQ

Let the complex number $z = x + iy$ be such that $\frac{2z-3i}{2z+i}$ is purely imaginary. If $x + y^2 = 0$, then $y^4 + y^2 - y$ is equal to

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

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

Q67 JEE Main 2023 · 10 Apr · Shift 2 · MCQ

Let $S = z = x + iy$: $\frac{2z-3i}{4z+2i}$ is a real number $\}$. Then which of the following is NOT correct?

(A) $y + x^2 + y^2 \neq -\frac{1}{4}$
(B) $(x, y) = 0, -\frac{1}{2}$
(C) $x = 0$
(D) $y \in -\infty, -\frac{1}{2} \cup -\frac{1}{2}, \infty$

Answer: (B) $(x, y) = 0, -\frac{1}{2}$ · Key from source paper

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Q68 JEE Main 2023 · 8 Apr · Shift 1 · MCQ

If for $z = \alpha + i\beta$, $|z + 2| = z + 4(1 + i)$, then $\alpha + \beta$ and $\alpha\beta$ are the roots of the equation

(A) $x^2 + 3x - 4 = 0$
(B) $x^2 + 7x + 12 = 0$
(C) $x^2 + x - 12 = 0$
(D) $x^2 + 2x - 3 = 0$

Answer: (B) $x^2 + 7x + 12 = 0$ · Key from source paper

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Q69 JEE Main 2023 · 8 Apr · Shift 2 MCQ

Let $A = \left\{\theta \in (0, 2\pi) : \frac{1+2i\sin\theta}{1-i\sin\theta} \text{ is purely imaginary}\right\}$ Then the sum of the elements is in A is

(A) 4π
(B) 3π
(C) π
(D) 2π

Answer: (A) 4π · Key from source paper

Q70 JEE Main 2023 · 6 Apr · Shift 2 MCQ

Let $a \neq b$ be two non-zero real numbers. Then the number of elements in the set $X = \{z \in C : \text{Re}(az^2 + bz) = a \text{ and } \text{Re}(bz^2 + az) = b\}$ is equal to

(A) 0
(B) 1
(C) 3
(D) 2

Answer: (A) 0 · Key from source paper

Q71 JEE Main 2023 · 6 Apr · Shift 2 Numerical

For $\alpha, \beta, z \in \mathbb{C}$ and $\lambda > 1$, if $\sqrt{\lambda - 1}$ is the radius of the circle $|z - \alpha|^2 + |z - \beta|^2 = 2\lambda$, then $|\alpha - \beta|$ is equal to _____ .

Numerical value type: the answer is a number.

Answer: 2. · Key from source paper

Q72 JEE Main 2023 · 1 Feb · Shift 1 MCQ

If the center and radius of the circle $\frac{z-2}{z-3} = 2$ are respectively α, β and γ, then $3\alpha + \beta + \gamma$ is equal to

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

Answer: (D) 12 · Key from source paper

Q73 JEE Main 2023 · 1 Feb · Shift 2 MCQ

Let a, b be two real numbers such that $ab < 0$. If the complex number $\frac{1+ai}{b+i}$ is of unit modulus and $a + ib$ lies on the circle $|z - 1| = |2z|$, then a possible value of $\frac{1+[a]}{4b}$, where $[t]$ is greatest integer

function, is :

(A) 0

(B) -1

(C) 1

(D) $\frac{1}{2}$

Answer: (A) 0 · Key from source paper

Q74 JEE Main 2023 · 31 Jan · Shift 1 MCQ

For all $z \in C$ on the curve C_1: $|z| = 4$, let the locus of the point $z + \frac{1}{z}$ be the curve C_2. Then

(A) the curves C_1 and C_2intersect at 4 points

(B) the curves C_1 lies inside C_2

(C) the curves C_1 and C_2 intersect at 2 points

(D) the curves C_2 lies inside C_1

Answer: (A) the curves C_1 and C_2intersect at 4 points · Key from source paper

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Q75 JEE Main 2023 · 31 Jan · Shift 2 MCQ

The complex number $z = \frac{i-1}{\cos\frac{\pi}{3}+i\sin\frac{\pi}{3}}$ is equal to:

(A) $\sqrt{2}i\left(\cos\frac{5\pi}{12} - i\sin\frac{5\pi}{12}\right)$

(B) $\cos\frac{\pi}{12} - i\sin\frac{\pi}{12}$

(C) $\sqrt{2}\left(\cos\frac{\pi}{12} + i\sin\frac{\pi}{12}\right)$

(D) $\sqrt{2}\left(\cos\frac{5\pi}{12} + i\sin\frac{5\pi}{12}\right)$

Answer: (D) $\sqrt{2}\left(\cos\frac{5\pi}{12} + i\sin\frac{5\pi}{12}\right)$ · Key from source paper

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Q76 JEE Main 2023 · 30 Jan · Shift 1 Numerical

Let $z = 1 + i$ and $z_1 = \frac{1+i\bar{z}}{\bar{z}(1-z)+\frac{1}{z}}$. Then $\frac{12}{\pi}\arg z_1$ is equal to

Numerical value type: the answer is a number.

Answer: 9. · Key from source paper

Q77 JEE Main 2023 · 29 Jan · Shift 1 MCQ

For two non-zero complex number z_1 and z_2, if $\mathrm{Re}(z_1 z_2) = 0$ and $\mathrm{Re}(z_1 + z_2) = 0$, then which of the following are possible?

(A) $\mathrm{Im}(z_1) > 0$ and $\mathrm{Im}(z_2) > 0$

(B) $\mathrm{Im}(z_1) < 0$ and $\mathrm{Im}(z_2) > 0$

(C) $\mathrm{Im}(z_1) > 0$ and $\mathrm{Im}(z_2) < 0$

(D) $\mathrm{Im}(z_1) < 0$ and $\mathrm{Im}(z_2) < 0$

Choose the correct answer from the options given below:

(A) B and D
(B) B and C
(C) A and B
(D) A and C

Answer: (B) B and C · Key from source paper

Q78 JEE Main 2023 · 29 Jan · Shift 2 · Numerical

Let $\alpha = 8 - 14\text{i}$, $A = \left\{z \in \mathbb{C} : \frac{\alpha z - \bar{\alpha}\bar{z}}{z^2 - (\bar{z})^2 - 112\text{i}} = 1\right\}$ and $B = \{z \in \mathbb{C} : |z + 3\text{i}| = 4\}$.

Then, $\sum_{z \in A \cap B}(Re\ z - Im z)$ is equal to _____

Numerical value type: the answer is a number.

Answer: 14. · Key from source paper

Q79 JEE Main 2023 · 25 Jan · Shift 1 · MCQ

Let $z_1 = 2 + 3i$ and $z_2 = 3 + 4i$. The set $\text{S} = \{z \in \mathbb{C} : |z - z_1|^2 - |z - z_2|^2 = |z_1 - z_2|^2\}$ represents a

(A) straight line with sum of its intercepts on the coordinate axes equals 14
(B) hyperbola with the length of the transverse axis 7
(C) straight line with the sum of its intercepts on the coordinate axes equals -18
(D) hyperbola with eccentricity 2

Answer: (A) straight line with sum of its intercepts on the coordinate axes equals 14 · Key from source paper

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Q80 JEE Main 2023 · 25 Jan · Shift 2 · MCQ

Let z be a complex number such that $\left|\frac{z-2i}{z+i}\right| = 2$, $z \neq -i$. Then z lies on the circle of radius 2 and centre

(A) $(2, 0)$
(B) $(0, 2)$
(C) $(0, 0)$
(D) $(0, -2)$

Answer: (D) $(0, -2)$ · Key from source paper

Q81 JEE Main 2023 · 24 Jan · Shift 1 · MCQ

Let $p,\ q \in \mathbb{R}$ and $\left(1 - \sqrt{3}i\right)^{200} = 2^{199}(p + iq)$, $i = \sqrt{-1}$. Then, $p + q + q^2$ and $p - q + q^2$ are roots of the equation.

(A) $x^2 + 4x - 1 = 0$
(B) $x^2 - 4x + 1 = 0$
(C) $x^2 + 4x + 1 = 0$
(D) $x^2 - 4x - 1 = 0$

Answer: (B) $x^2 - 4x + 1 = 0$ · Key from source paper

Q82 JEE Main 2023 · 24 Jan · Shift 2 MCQ

The value of $\left(\frac{1+\sin\frac{2\pi}{9}+i\cos\frac{2\pi}{9}}{1+\sin\frac{2\pi}{9}-i\cos\frac{2\pi}{9}}\right)^3$ is

(A) $\frac{-1}{2}\left(1-i\sqrt{3}\right)$
(B) $\frac{1}{2}\left(1-i\sqrt{3}\right)$
(C) $\frac{-1}{2}\left(\sqrt{3}-i\right)$
(D) $\frac{1}{2}\left(\sqrt{3}+i\right)$

Answer: (C) $\frac{-1}{2}\left(\sqrt{3}-i\right)$ · Key from source paper

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Q83 JEE Main 2022 · 29 Jul · Shift 1 MCQ

If $z = 2 + 3i$, then $z^5 + (\bar{z})^5$ is equal to:

(A) 244
(B) 224
(C) 245
(D) 265

Answer: (A) 244 · Key from source paper

Q84 JEE Main 2022 · 29 Jul · Shift 2 MCQ

If $z \neq 0$ be a complex number such that $z - \frac{1}{z} = 2$, then the maximum value of z is

(A) $\sqrt{2}$
(B) 1
(C) $\sqrt{2} - 1$
(D) $\sqrt{2} + 1$

Answer: (D) $\sqrt{2} + 1$ · Key from source paper

Q85 JEE Main 2022 · 29 Jul · Shift 2 MCQ

Let $S = z = x + iy : z - 1 + i \geq z, z < 2, z + i = z - 1$. Then the set of all values of x, for which $w = 2x + iy \in S$ for some $y \in \mathbb{R}$, is

(A) $-\sqrt{2}, \frac{1}{2\sqrt{2}}$
(B) $-\frac{1}{\sqrt{2}}, \frac{1}{4}$
(C) $-\sqrt{2}, \frac{1}{2}$
(D) $-\frac{1}{\sqrt{2}}, \frac{1}{2\sqrt{2}}$

Answer: (B) $-\frac{1}{\sqrt{2}}, \frac{1}{4}$ · Key from source paper

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Q86 JEE Main 2022 · 28 Jul · Shift 1 MCQ

Let $S_1 = z_1 \in C : z_1 - 3 = \frac{1}{2}$ and $S_2 = z_2 \in C : z_2 - z_2 + 1 = z_2 + z_2 - 1$. Then, for $z_1 \in S_1$ and $z_2 \in S_2$, the least value of $z_2 - z_1$ is

(A) 0
(B) $\frac{1}{2}$
(C) $\frac{3}{2}$
(D) $\frac{5}{2}$

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

Q87 JEE Main 2022 · 28 Jul · Shift 2 Numerical

Let $\mathrm{z} = \mathrm{a} + i\mathrm{b}$, $\mathrm{b} \neq 0$ be complex numbers satisfying $\mathrm{z}^2 = \bar{\mathrm{z}} \cdot 2^{1-|\mathrm{z}|}$. Then the least value of $n \in N$, such that $\mathrm{z}^n = (\mathrm{z}+1)^n$, is equal to _____.

Numerical value type: the answer is a number.

Answer: 6. · Key from source paper

Q88 JEE Main 2022 · 27 Jul · Shift 1 MCQ

Let the minimum value v_0 of $v = |z|^2 + |z-3|^2 + |z-6i|^2$, $z \in \mathbb{C}$ is attained at $z = z_0$. Then $\left|2z_0^2 - \bar{z}_0^3 + 3\right|^2 + v_0^2$ is equal to

(A) 1000
(B) 1024
(C) 1105
(D) 1196

Answer: (A) 1000 · Key from source paper

Q89 JEE Main 2022 · 27 Jul · Shift 1 Numerical

Let $S = \{z \in \mathbb{C} : z^2 + \bar{z} = 0\}$. Then $\sum_{z \in S} (\mathrm{Re}\,(z) + \mathrm{Im}\,(z))$ is equal to _____ .

Numerical value type: the answer is a number.

Answer: 0. · Key from source paper

Q90 JEE Main 2022 · 27 Jul · Shift 2 MCQ

Let S be the set of all (α, β), $\pi < \alpha, \beta < 2\pi$, for which the complex number $\frac{1-i\sin\alpha}{1+2i\sin\alpha}$ is purely imaginary and $\frac{1+i\cos\beta}{1-2i\cos\beta}$ is purely real. Let $Z_{\alpha\beta} = \sin 2\alpha + i\cos 2\beta$, $(\alpha, \beta) \in S$. Then $\sum_{(\alpha,\beta)\in S}\left(iZ_{\alpha\beta} + \frac{1}{i\bar{Z}_{\alpha\beta}}\right)$ is equal to :

(A) 3
(B) $3i$
(C) 1
(D) $2 - i$

Answer: (C) 1 · Key from source paper

Q91 JEE Main 2022 · 26 Jul · Shift 1 MCQ

Let O be the origin and A be the point $z_1 = 1 + 2i$. If B is the point z_2, $\mathrm{Re}\,(z_2) < 0$, such that OAB is a right angled isosceles triangle with OB as hypotenuse, then which of the following is NOT true?

(A) $\arg\, z_2 = \pi - \tan^{-1} 3$
(B) $\arg(z_1 - 2z_2) = -\tan^{-1}\frac{4}{3}$
(C) $|z_2| = \sqrt{10}$
(D) $|2z_1 - z_2| = 5$

Answer: (D) $|2z_1 - z_2| = 5$ · Key from source paper

Q92 JEE Main 2022 · 26 Jul · Shift 2 MCQ

If $z = x + iy$ satisfies $z - 2 = 0$ and $z - i - z + 5i = 0$, then

(A) $x + 2y - 4 = 0$
(B) $x^2 + y - 4 = 0$
(C) $x + 2y + 4 = 0$
(D) $x^2 - y + 3 = 0$

Answer: (C) $x + 2y + 4 = 0$ · Key from source paper

Q93 JEE Main 2022 · 25 Jul · Shift 1 MCQ

If $\alpha, \beta, \gamma, \delta$ are the roots of the equation $x^4 + x^3 + x^2 + x + 1 = 0$, then $\alpha^{2021} + \beta^{2021} + \gamma^{2021} + \delta^{2021}$ is equal to

(A) 4
(B) 1
(C) -4
(D) -1

Answer: (D) -1 · Key from source paper

Q94 JEE Main 2022 · 25 Jul · Shift 2 MCQ

For $z \in \mathbb{C}$ if the minimum value of $\left(|z-3\sqrt{2}|+|z-p\sqrt{2}i|\right)$ is $5\sqrt{2}$, then a value of p is _____.

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

Answer: (C) 4 · Key from source paper

Q95 JEE Main 2022 · 29 Jun · Shift 1 MCQ

Let α and β be the roots of the equation $x^2+(2i-1)=0$. Then, the value of $\left|\alpha^8+\beta^8\right|$ is equal to

(A) 50
(B) 250
(C) 1250
(D) 1550

Answer: (A) 50 · Key from source paper

Q96 JEE Main 2022 · 29 Jun · Shift 1 Numerical

Let $S=\{z \in C : |z-2| \leq 1,\ z(1+i)+\bar{z}(1-i) \leq 2\}$. Let $|z-4i|$ attains minimum and maximum values, respectively, at $z_1 \in S$ and $z_2 \in S$. If $5\left(|z_1|^2+|z_2|^2\right)=\alpha+\beta\sqrt{5}$, where α and β are integers, then the value of $\alpha+\beta$ is equal to _____.

Numerical value type: the answer is a number.

Answer: 26. · Key from source paper

Q97 JEE Main 2022 · 29 Jun · Shift 2 MCQ

Let α be a root of the equation $1+x^2+x^4=0$. Then the value of $\alpha^{1011}+\alpha^{2022}-\alpha^{3033}$ is equal to:

(A) 1
(B) α
(C) $1+\alpha$
(D) $1+2\alpha$

Answer: (A) 1 · Key from source paper

Q98 JEE Main 2022 · 29 Jun · Shift 2 MCQ

Let (z) represent the principal argument of the complex number z. The, $|z|=3$ and $\arg(z-1)-\arg(z+1)=\frac{\pi}{4}$ intersect:

(A) Exactly at one point
(B) Exactly at two points
(C) Nowhere
(D) At infinitely many points.

Answer: (C) Nowhere · Key from source paper

Q99 JEE Main 2022 · 28 Jun · Shift 1 Numerical

The number of elements in the set $\{z = a + ib \in \mathbb{C} : a, b \in \mathbb{Z} \text{ and } 1 < |z - 3 + 2i| < 4\}$ is _____.

Numerical value type: the answer is a number.

Answer: 40. · Key from source paper

Q100 JEE Main 2022 · 28 Jun · Shift 2 Numerical

Sum of squares of modulus of all the complex numbers z satisfying $\bar{z} = iz^2 + z^2 - z$ is equal to

Numerical value type: the answer is a number.

Answer: 2. · Key from source paper

Q101 JEE Main 2022 · 27 Jun · Shift 1 MCQ

The area of the polygon, whose vertices are the non-real roots of the equation $\bar{z} = iz^2$ is

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

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

Q102 JEE Main 2022 · 27 Jun · Shift 2 MCQ

The number of points of intersection $|z - (4 + 3i)| = 2$ and $|z| + |z - 4| = 6,\ z \in C$ is

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

Answer: (B) 2 · Key from source paper

Q103 JEE Main 2022 · 27 Jun · Shift 2 MCQ

Let for some real numbers α and β, $a = \alpha - i\beta$. If the system of equations $4ix + (1 + i)y = 0$ and $8\left(\cos\frac{2\pi}{3} + i\sin\frac{2\pi}{3}\right)x + \bar{a}y = 0$ has more than one solution then $\frac{\alpha}{\beta}$ is equal to

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

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

Q104 JEE Main 2022 · 26 Jun · Shift 1 MCQ

Let $A=\left\{z \in C:\left|\frac{z+1}{z-1}\right|<1\right\}$ and $B=\left\{z \in C: \arg\left(\frac{z-1}{z+1}\right)=\frac{2\pi}{3}\right\}$. Then $A \cap B$ is

(A) a portion of a circle centred at $\left(0,-\frac{1}{\sqrt{3}}\right)$ that lies in the second and third quadrants only
(B) a portion of a circle centred at $\left(0,-\frac{1}{\sqrt{3}}\right)$ that lies in the second quadrant only
(C) an empty set
(D) a portion of a circle of radius $\frac{2}{\sqrt{3}}$ that lies in the third quadrant only

Answer: (B) a portion of a circle centred at $\left(0,-\frac{1}{\sqrt{3}}\right)$ that lies in the second quadrant only · Key from source paper

Q105 JEE Main 2022 · 26 Jun · Shift 2 Numerical

If $z^2+z+1=0, z \in C$, then $\left|\sum_{n=1}^{15}\left(z^n+(-1)^n \frac{1}{z^n}\right)^2\right|$ is equal to _____ .

Numerical value type: the answer is a number.

Answer: 2. · Key from source paper

Q106 JEE Main 2022 · 25 Jun · Shift 1 MCQ

Let a circle C in complex plane pass through the points $z_1=3+4i, z_2=4+3i$ and $z_3=5i$. If $z \neq z_1$ is a point on C such that the line through z and z_1 is perpendicular to the line through z_2 and z_3, then $\arg z$ is equal to

(A) $\tan^{-1}\frac{24}{7}-\pi$
(B) $\tan^{-1}\frac{2}{\sqrt{5}}-\pi$
(C) $\tan^{-1}3-\pi$
(D) $\tan^{-1}\frac{3}{4}-\pi$

Answer: (A) $\tan^{-1}\frac{24}{7}-\pi$ · Key from source paper

Q107 JEE Main 2022 · 25 Jun · Shift 2 MCQ

Let z_1 and z_2 be two complex numbers such that $\bar{z}_1=i\bar{z}_2$ and $\arg\frac{z_1}{z_2}=\pi$, then the argument of z_1 is

(A) $\arg z_2 = \frac{\pi}{4}$
(B) $\arg z_2 = -\frac{3\pi}{4}$
(C) $\arg z_1 = \frac{\pi}{4}$
(D) $\arg z_1 = -\frac{3\pi}{4}$

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

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Q108 JEE Main 2022 · 24 Jun · Shift 1 MCQ

Let $A = \{z \in \mathbb{C} : 1 \le |z - (1+i)| \le 2\}$ and $B = \{z \in A : |z - (1-i)| = 1\}$. Then, B

(A) is an empty set
(B) contains exactly two elements
(C) contains exactly three elements
(D) is an infinite set

Answer: (D) is an infinite set · Key from source paper

Q109 JEE Main 2022 · 24 Jun · Shift 2 Numerical

Let $S = \{z \in \mathbb{C} : |z - 3| \le 1 \text{ and } z(4+3i) + \bar{z}(4-3i) \le 24\}$. If $\alpha + i\beta$ is the point in S which is closest to $4i$, then $25(\alpha + \beta)$ is equal to _____ .

Numerical value type: the answer is a number.

Answer: 80. · Key from source paper

Q110 JEE Main 2021 · 1 Sep · Shift 2 Numerical

If for the complex numbers z satisfying $|z - 2 - 2i| \le 1$, the maximum value of $|3iz + 6|$ is attained at $a + ib$, then $a + b$ is equal to _____.

Numerical value type: the answer is a number.

Answer: 5. · Key from source paper

Q111 JEE Main 2021 · 31 Aug · Shift 1 Numerical

A point z moves in the complex plane such that $\arg\left(\frac{z-2}{z+2}\right) = \frac{\pi}{4}$, then the minimum value of $\left|z - 9\sqrt{2} - 2i\right|^2$ is equal to _____

Numerical value type: the answer is a number.

Answer: 98. · Key from source paper

Q112 JEE Main 2021 · 31 Aug · Shift 2 MCQ

If z is a complex number such that $\frac{z-i}{z-1}$ is purely imaginary, then the minimum value of $|z - (3 + 3\,i)|$ is :

(A) $3\sqrt{2}$
(B) $2\sqrt{2}$
(C) $2\sqrt{2}-1$
(D) $6\sqrt{2}$

Answer: (B) $2\sqrt{2}$ · Key from source paper

Q113 JEE Main 2021 · 27 Aug · Shift 1 MCQ

If $\mathrm{S}=\left\{z \in C: \frac{z-i}{z+2i} \in R\right\}$, then

(A) S is a circle in the complex plane
(B) S contains exactly two elements
(C) S contains only one element
(D) S is a straight line in the complex plane

Answer: (D) S **is a straight line in the complex plane** · Key from source paper

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Q114 JEE Main 2021 · 27 Aug · Shift 2 Numerical

Let z_1 and z_2 be two complex numbers such that $\arg(z_1-z_2)=\frac{\pi}{4}$ and z_1, z_2 satisfy the equation $|z-3|=\operatorname{Re}(z)$. Then the imaginary part z_1+z_2 is equal to

Numerical value type: the answer is a number.

Answer: 6. · Key from source paper

Q115 JEE Main 2021 · 26 Aug · Shift 1 MCQ

The equation $arg\left(\frac{z-1}{z+1}\right)=\frac{\pi}{4}$ represents a circle with:

(A) centre at $(0,0)$ and radius $\sqrt{2}$
(B) centre at $(0,1)$ and radius 2
(C) centre at $(0,-1)$ and radius $\sqrt{2}$
(D) centre at $(0,1)$ and radius $\sqrt{2}$

Answer: (D) centre at $(0,1)$ **and radius** $\sqrt{2}$ · Key from source paper

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Q116 JEE Main 2021 · 26 Aug · Shift 1 Numerical

Let $z=\frac{1-i\sqrt{3}}{2}$, $i=\sqrt{-1}$. Then the value of $21+\left(z+\frac{1}{z}\right)^3+\left(z^2+\frac{1}{z^2}\right)^3+\left(z^3+\frac{1}{z^3}\right)^3+\ldots+\left(z^{21}+\frac{1}{z^{21}}\right)^3$ is _____.

Numerical value type: the answer is a number.

Answer: 13. · Key from source paper

Q117 JEE Main 2021 · 26 Aug · Shift 2 MCQ

If $\left(\sqrt{3}+i\right)^{100}=2^{99}(p+iq)$, then p and q are roots of the equation :

(A) $x^2 - \left(\sqrt{3}+1\right)x + \sqrt{3} = 0$
(B) $x^2 + \left(\sqrt{3}+1\right)x + \sqrt{3} = 0$
(C) $x^2 + \left(\sqrt{3}-1\right)x - \sqrt{3} = 0$
(D) $x^2 - \left(\sqrt{3}-1\right)x - \sqrt{3} = 0$

Answer: (D) $x^2 - \left(\sqrt{3}-1\right)x - \sqrt{3} = 0$ · Key from source paper

Q118 JEE Main 2021 · 26 Aug · Shift 2 Numerical

The least positive integer n such that $\frac{(2i)^n}{(1-i)^{n-2}}$, $i = \sqrt{-1}$, is a positive integer, is _____.

Numerical value type: the answer is a number.

Answer: 6. · Key from source paper

Q119 JEE Main 2021 · 27 Jul · Shift 1 MCQ

Let C be the set of all complex numbers. Let
$S_1 = \{z \in C \mid |z - 3 - 2i|^2 = 8\}$,
$S_2 = z \in C \mid \mathrm{Re}(z) \geq 5$ and
$S_3 = \{z \in C \mid |z - \bar{z}| \geq 8\}$.
Then the number of elements in $S_1 \cap S_2 \cap S_3$ is equal to

(A) 1
(B) 0
(C) 2
(D) Infinite

Answer: (A) 1 · Key from source paper

Q120 JEE Main 2021 · 27 Jul · Shift 2 MCQ

Let $\mathbb{C}$ be the set of all complex numbers. Let $S_1 = \{z \in \mathbb{C} : |z - 2| \leq 1\}$ and $S_2 = \{z \in \mathbb{C} : z(1+i) + \bar{z}(1-i) \geq 4\}$. Then, the maximum value of $\left|z - \frac{5}{2}\right|^2$ for $z \in S_1 \cap S_2$ is equal to :

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

Answer: (D) $\frac{5+2\sqrt{2}}{4}$ · Key from source paper

Q121 JEE Main 2021 · 27 Jul · Shift 2 Numerical

If the real part of the complex number $z = \frac{3+2i\cos\theta}{1-3i\cos\theta}$, $\theta \in \left(0, \frac{\pi}{2}\right)$ is zero, then the value of $\sin^2 3\theta + \cos^2\theta$ is equal to _____.

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Numerical value type: the answer is a number.

Answer: 1. · Key from source paper

Q122 JEE Main 2021 · 25 Jul · Shift 2 Numerical

The equation of a circle is $\mathrm{Re}\left(z^2\right)+2(\mathrm{Im}(z))^2+2\,\mathrm{Re}\,(z)=0$, where $z=x+iy$. A line which passes through the centre of the given circle and the vertex of the parabola, $x^2-6x-y+13=0$, has y-intercept equal to _____.

Numerical value type: the answer is a number.

Answer: 1. · Key from source paper

Q123 JEE Main 2021 · 22 Jul · Shift 1 MCQ

Let n denote the number of solutions of the equation $z^2+3\bar{z}=0$, where z is a complex number. Then the value of $\sum_{k=0}^{\infty}\frac{1}{n^k}$ is equal to

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

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

Q124 JEE Main 2021 · 20 Jul · Shift 1 MCQ

If α and β are the distinct roots of the equation $x^2+(3)^{\frac{1}{4}}x+3^{\frac{1}{2}}=0$, then the value of $\alpha^{96}\left(\alpha^{12}-1\right)+\beta^{96}\left(\beta^{12}-1\right)$ is equal to:

(A) 56×3^{25}
(B) 56×3^{24}
(C) 52×3^{24}
(D) 28×3^{25}

Answer: (C) 52×3^{24} · Key from source paper

Q125 JEE Main 2021 · 20 Jul · Shift 1 MCQ

If z and w are two complex numbers such that $|zw|=1$ and $\arg(z)-\arg(w)=\frac{3\pi}{2}$, then $\arg\left(\frac{1-2\bar{z}w}{1+3\bar{z}w}\right)$ is:

(Here $\arg(z)$ denotes the principal argument of complex number z)

EdLoop JEE

(A) $\frac{\pi}{4}$
(B) $-\frac{3\pi}{4}$
(C) $-\frac{\pi}{4}$
(D) $\frac{3\pi}{4}$

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

Q126 JEE Main 2021 · 20 Jul · Shift 2 MCQ

If the real part of the complex number $(1-\cos\theta+2i\sin\theta)^{-1}$ is $\frac{1}{5}$ for $\theta\in(0,\pi)$, then the value of the integral $\int_0^{\theta}\sin x\,dx$ is equal to:

(A) 1
(B) 2
(C) -1
(D) 0

Answer: (A) 1 · Key from source paper

Q127 JEE Main 2021 · 18 Mar · Shift 1 MCQ

If the equation $a|z|^2+\overline{\alpha}z+\alpha\overline{z}+d=0$ represents a circle where a,d are real constants then which of the following condition is correct?

(A) $|\alpha|^2-ad\neq 0$
(B) $|\alpha|^2-ad>0$ and $a\in R-\{0\}$
(C) $|\alpha|^2-ad\geq 0$ and $a\in R$
(D) $\alpha=0,a,d\in R^+$

Answer: (B) $|\alpha|^2-ad>0$ and $a\in R-\{0\}$ · Key from source paper

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Q128 JEE Main 2021 · 18 Mar · Shift 1 Numerical

Let z_1, z_2 be the roots of the equation $z^2+az+12=0$ and z_1, z_2 form an equilateral triangle with origin. Then, the value of $|a|$ is

Numerical value type: the answer is a number.

Answer: 6. · Key from source paper

Q129 JEE Main 2021 · 18 Mar · Shift 2 MCQ

Let a complex number be $w=1-\sqrt{3}i$. Let another complex number z be such that $|zw|=1$ and $\arg(z)-\arg(w)=\frac{\pi}{2}$. Then the area of the triangle (in sq. units) with vertices origin, z and w is equal to

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

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

Q130 JEE Main 2021 · 18 Mar · Shift 2 Numerical

If $f(x)$ and $g(x)$ are two polynomials such that the polynomial $P(x) = f(x^3) + xg(x^3)$ is divisible by $x^2 + x + 1$, then $P(1)$ is equal to _____ .

Numerical value type: the answer is a number.

Answer: 0. · Key from source paper

Q131 JEE Main 2021 · 17 Mar · Shift 1 MCQ

The area of the triangle with vertices $P(z), Q(iz)$ and $R(z + iz)$ is

(A) 1
(B) $\frac{1}{2}|z|^2$
(C) $\frac{1}{2}$
(D) $\frac{1}{2}|z + iz|^2$

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

Q132 JEE Main 2021 · 17 Mar · Shift 2 MCQ

Let S_1, S_2 and S_3 be three sets defined as
$S_1 = \{z \in \mathbb{C} : |z - 1| \leq \sqrt{2}\}$,
$S_2 = \{z \in \mathbb{C} : \text{Re}((1 - i)z) \geq 1\}$ and
$S_3 = \{z \in \mathbb{C} : \text{Im}(z) \leq 1\}$.
Then, the set $S_1 \cap S_2 \cap S_3$

(A) is a singleton
(B) has exactly two elements
(C) has infinitely many elements
(D) has exactly three elements

Answer: (C) has infinitely many elements · Key from source paper

Q133 JEE Main 2021 · 16 Mar · Shift 1 Numerical

Let z and w be two complex numbers such that $w = z\bar{z} - 2z + 2$, $\left|\frac{z+i}{z-3i}\right| = 1$ and $\text{Re}(w)$ has minimum value. Then, the minimum value of $n \in N$ for which w^n is real, is equal to _____.

EdLoop JEE

Numerical value type: the answer is a number.

Answer: 4. · Key from source paper

Q134 JEE Main 2021 · 26 Feb · Shift 1 Numerical

The sum of 162th power of the roots of the equation $x^3 - 2x^2 + 2x - 1 = 0$ is _____.

Numerical value type: the answer is a number.

Answer: 3. · Key from source paper

Q135 JEE Main 2021 · 26 Feb · Shift 2 Numerical

Let z be those complex numbers which satisfy $|z + 5| \leq 4$ and $z(1 + i) + \bar{z}(1 - i) \geq -10$, $i = \sqrt{-1}$. If maximum value of $|z + 1|^2$ is $\alpha + \beta\sqrt{2}$, then the value of $(\alpha + \beta)$ is

Numerical value type: the answer is a number.

Answer: 48. · Key from source paper

Q136 JEE Main 2021 · 25 Feb · Shift 1 MCQ

Let the lines $(2 - i)z = (2 + i)\bar{z}$ and $(2 + i)z + (i - 2)\bar{z} - 4i = 0$, (here $i^2 = -1$) be normal to a circle C. If the line $iz + \bar{z} + 1 + i = 0$ is tangent to this circle C, then its radius is :

(A) $\frac{3}{\sqrt{2}}$

(B) $3\sqrt{2}$

(C) $\frac{3}{2\sqrt{2}}$

(D) $\frac{1}{2\sqrt{2}}$

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

Q137 JEE Main 2021 · 24 Feb · Shift 2 Numerical

Let $i = \sqrt{-1}$. If $\frac{\left(-1+i\sqrt{3}\right)^{21}}{(1-i)^{24}} + \frac{\left(1+i\sqrt{3}\right)^{21}}{(1+i)^{24}} = k$, and $n = [|k|]$ be the greatest integral part of $|k|$. Then $\sum_{j=0}^{n+5}(j+5)^2 - \sum_{j=0}^{n+5}(j+5)$ is equal to _____.

Numerical value type: the answer is a number.

Answer: 310. · Key from source paper

Q138 JEE Main 2020 · 6 Sep · Shift 1 MCQ

The region represented by $\{z = x + iy \in C : |z| - \text{Re}\,(z) \leq 1\}$ is also given by the inequality

(A) $y^2 \geq 2(x+1)$
(B) $y^2 \leq 2\left(x+\frac{1}{2}\right)$
(C) $y^2 \leq \left(x+\frac{1}{2}\right)$
(D) $y^2 \geq x+1$

Answer: (B) $y^2 \leq 2\left(x+\frac{1}{2}\right)$ · Key from source paper

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Q139 JEE Main 2020 · 6 Sep · Shift 2 MCQ

Let $z = x + iy$ be a non-zero complex number such that $z^2 = i|z|^2$, where $i = \sqrt{-1}$, then z lies on the :

(A) line, $y = -x$
(B) imaginary axis
(C) line, $y = x$
(D) real axis

Answer: (C) line, $y = x$ · Key from source paper

Q140 JEE Main 2020 · 5 Sep · Shift 1 MCQ

If the four complex numbers $z, \bar{z}, \bar{z} - 2\,\mathrm{Re}\,(\bar{z})$ and $z - 2\,\mathrm{Re}\,(z)$ represent the vertices of a square of side 4 units in the Argand plane, then $|z|$ is equal to :

(A) $4\sqrt{2}$
(B) 4
(C) $2\sqrt{2}$
(D) 2

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

Q141 JEE Main 2020 · 5 Sep · Shift 2 MCQ

The value of $\left(\frac{-1+i\sqrt{3}}{1-i}\right)^{30}$ is :

(A) 6^5
(B) 2^{15} i
(C) -2^{15}
(D) -2^{15}i

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

Q142 JEE Main 2020 · 4 Sep · Shift 1 MCQ

Let $u = \frac{2z+i}{z-ki}$, $z = x + iy$ and $k > 0$. If the curve represented byRe (u)+ Im $(u) = 1$ intersects the y-axis at points P and Q where $PQ = 5$ then the value of k is

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

Answer: (D) 2 · Key from source paper

Q143 JEE Main 2020 · 4 Sep · Shift 2 MCQ

If a and b are real numbers such that $(2+\alpha)^4 = a + b\alpha$, where $\alpha = \frac{-1+i\sqrt{3}}{2}$, then $a + b$ is equal to:

(A) 9
(B) 24
(C) 33
(D) 57

Answer: (A) 9 · Key from source paper

Q144 JEE Main 2020 · 3 Sep · Shift 1 Numerical

If $\left(\frac{1+i}{1-i}\right)^{\frac{m}{2}} = \left(\frac{1+i}{i-1}\right)^{\frac{n}{3}} = 1,\ (m,\ n \in N)$ then the greatest common divisor of the least values of m and n is

Numerical value type: the answer is a number.

Answer: 4. · Key from source paper

Q145 JEE Main 2020 · 3 Sep · Shift 2 MCQ

If z_1, z_2 are complex numbers such that $\mathrm{Re}\,(z_1) = |z_1 - 1|$ and $\mathrm{Re}\,(z_2) = |z_2 - 1|$ and $\arg(z_1 - z_2) = \frac{\pi}{6}$, then $Im(z_1 + z_2)$ is equal to :

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

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

Q146 JEE Main 2020 · 2 Sep · Shift 1 MCQ

The value of $\left(\frac{1+\sin\frac{2\pi}{9}+i\cos\frac{2\pi}{9}}{1+\sin\frac{2\pi}{9}-i\cos\frac{2\pi}{9}}\right)^3$ is

(A) $\frac{1}{2}\left(1-i\sqrt{3}\right)$
(B) $\frac{1}{2}\left(\sqrt{3}-i\right)$
(C) $-\frac{1}{2}\left(\sqrt{3}-i\right)$
(D) $-\frac{1}{2}\left(1-i\sqrt{3}\right)$

Answer: (C) $-\frac{1}{2}\left(\sqrt{3}-i\right)$ · Key from source paper

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Q147 JEE Main 2020 · 2 Sep · Shift 2 MCQ

The imaginary part of $\left(3+2\sqrt{-54}\right)^{\frac{1}{2}}-\left(3-2\sqrt{-54}\right)^{\frac{1}{2}}$,can be

(A) $-\sqrt{6}$
(B) $-2\sqrt{6}$
(C) 6
(D) $\sqrt{6}$

Answer: (B) $-2\sqrt{6}$ · Key from source paper

Q148 JEE Main 2020 · 9 Jan · Shift 1 MCQ

Let z be a complex number such that $\left|\frac{z-i}{z+2i}\right|=1$ and $|z|=\frac{5}{2}$. Then, the value of $|z+3i|$ is

(A) $\sqrt{10}$
(B) $\frac{7}{2}$
(C) $\frac{15}{4}$
(D) $2\sqrt{3}$

Answer: (B) $\frac{7}{2}$ · Key from source paper

Q149 JEE Main 2020 · 9 Jan · Shift 2 MCQ

If z is a complex number satisfying $|Re(z)|+|Im(z)|=4$, then $|z|$ cannot be

(A) $\sqrt{\frac{17}{2}}$
(B) $\sqrt{10}$
(C) $\sqrt{7}$
(D) $\sqrt{8}$

Answer: (C) $\sqrt{7}$ · Key from source paper

Q150 JEE Main 2020 · 8 Jan · Shift 2 MCQ

Let $\alpha=\frac{-1+i\sqrt{3}}{2}$. If $a=(1+\alpha)\sum_{k=0}^{100}\alpha^{2k}$ and $b=\sum_{k=0}^{100}\alpha^{3k}$, then a and b, are the roots of the quadratic equation.

(A) $x^2 + 101x + 100 = 0$

(B) $x^2 - 102x + 101 = 0$

(C) $x^2 - 101x + 100 = 0$

(D) $x^2 + 102x + 101 = 0$

Answer: (B) $x^2 - 102x + 101 = 0$ · Key from source paper

Q151 JEE Main 2020 · 7 Jan · Shift 1 MCQ

If $\mathrm{Re}\left(\frac{z-1}{2z+i}\right) = 1$, where $z = x + iy$, then the point (x, y) lies on a

(A) circle whose centre is at $\left(-\frac{1}{2}, -\frac{3}{2}\right)$

(B) straight line whose slope is $-\frac{2}{3}$

(C) straight line whose slope is $\frac{3}{2}$

(D) circle whose diameter is $\frac{\sqrt{5}}{2}$

Answer: (D) circle whose diameter is $\frac{\sqrt{5}}{2}$ · Key from source paper

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Q152 JEE Main 2020 · 7 Jan · Shift 2 MCQ

If $\frac{3+i\sin\theta}{4-i\cos\theta}$, $\theta \in [0, 2\pi]$, is a real number, then an argument of $\sin\theta + i\cos\theta$ is

(A) $\pi - \tan^{-1}\left(\frac{4}{3}\right)$

(B) $\pi - \tan^{-1}\left(\frac{3}{4}\right)$

(C) $-\tan^{-1}\left(\frac{3}{4}\right)$

(D) $\tan^{-1}\left(\frac{4}{3}\right)$

Answer: (A) $\pi - \tan^{-1}\left(\frac{4}{3}\right)$ · Key from source paper

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Q153 JEE Main 2019 · 12 Apr · Shift 1 MCQ

The equation $|z - i| = |z - 1|, i = \sqrt{-1}$, represents:

(A) a circle of radius $\frac{1}{2}$

(B) a circle of radius 1

(C) the line through the origin with slope 1

(D) the line through the origin with slope -1

Answer: (C) the line through the origin with slope 1 · Key from source paper

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Q154 JEE Main 2019 · 12 Apr · Shift 2 MCQ

Let $z \in C$ with $\mathrm{Im}(z) = 10$ and it satisfies $\frac{2z-n}{2z+n} = 2i - 1$ for some natural number n. Then

(A) $n = 20$ and $\mathrm{Re}(z) = 10$
(B) $n = 40$ and $\mathrm{Re}(z) = 10$
(C) $n = 20$ and $\mathrm{Re}(z) = -10$
(D) $n = 40$ and $\mathrm{Re}(z) = -10$

Answer: (D) $n = 40$ and $\mathrm{Re}(z) = -10$ · Key from source paper

Q155 JEE Main 2019 · 10 Apr · Shift 1 MCQ

If $a > 0$ and $z = \frac{(1+i)^2}{a-i}$, has magnitude $\sqrt{\frac{2}{5}}$, then $\bar{z}$ is equal to:

(A) $-\frac{1}{5} - \frac{3}{5}i$
(B) $-\frac{3}{5} - \frac{1}{5}i$
(C) $\frac{1}{5} - \frac{3}{5}i$
(D) $-\frac{1}{5} + \frac{3}{5}i$

Answer: (A) $-\frac{1}{5} - \frac{3}{5}i$ · Key from source paper

Q156 JEE Main 2019 · 10 Apr · Shift 2 MCQ

If z and ω are two complex numbers such that $z\omega = 1$ and $arg z - arg(\omega) = \frac{\pi}{2}$, then:

(A) $z\bar{\omega} = \frac{1-i}{\sqrt{2}}$
(B) $\bar{z}\omega = i$
(C) $z\bar{\omega} = \frac{-1+i}{\sqrt{2}}$
(D) $\bar{z}\omega = -i$

Answer: (D) $\bar{z}\omega = -i$ · Key from source paper

Q157 JEE Main 2019 · 9 Apr · Shift 1 MCQ

All the points in the set $S = \left\{\frac{\alpha + i}{\alpha - i},\ \alpha \in R\right\}$, $i = \sqrt{-1}$ lie on a

(A) straight line whose slope is -1
(B) circle whose radius is $\sqrt{2}$
(C) circle whose radius is 1
(D) straight line whose slope is 1

Answer: (C) circle whose radius is 1 · Key from source paper

Q158 JEE Main 2019 · 9 Apr · Shift 2 MCQ

Let $z \in C$ be such that $|z| < 1$. If $\omega = \frac{5 + 3z}{5(1 - z)}$, then:

(A) $5Re(\omega) > 1$
(B) $5Im(\omega) < 1$
(C) $5Re(\omega) > 4$
(D) $4Im(\omega) > 5$

Answer: (A) $5Re(\omega) > 1$ · Key from source paper

Q159 JEE Main 2019 · 8 Apr · Shift 1 MCQ

If α and β be the roots of the equation $x^2 - 2x + 2 = 0$, then the least value of n for which $\left(\frac{\alpha}{\beta}\right)^n = 1$ is

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

Answer: (B) 4 · Key from source paper

Q160 JEE Main 2019 · 8 Apr · Shift 2 MCQ

If $z = \frac{\sqrt{3}}{2} + \frac{i}{2}$ $(i = \sqrt{-1})$, then $(1 + iz + z^5 + iz^8)^9$ is equal to:

(A) -1
(B) 1
(C) 0
(D) $(-1 + 2i)^9$

Answer: (A) -1 · Key from source paper

Q161 JEE Main 2019 · 12 Jan · Shift 1 MCQ

If $\frac{z-\alpha}{z+\alpha}$ $(\alpha \in R)$ is a purely imaginary number and $|z| = 2$, then a value of α is :

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

Answer: (D) 2 · Key from source paper

Q162 JEE Main 2019 · 12 Jan · Shift 2 MCQ

Let z_1 and z_2 be two complex numbers satisfying $|z_1| = 9$ and $|z_2 - 3 - 4i| = 4$. Then the minimum value of $|z_1 - z_2|$ is :

(A) 2
(B) $\sqrt{2}$
(C) 0
(D) 1

Answer: (C) 0 · Key from source paper

Q163 JEE Main 2019 · 11 Jan · Shift 1 MCQ

Let $\left(-2-\frac{1}{3}i\right)^3=\frac{x+iy}{27}$ $(i=\sqrt{-1})$, where x and y are real numbers then y − x equals

(A) 91
(B) -85
(C) 85
(D) -91

Answer: (A) 91 · Key from source paper

Q164 JEE Main 2019 · 11 Jan · Shift 2 MCQ

Let z be a complex number such that $|z|+z=3+i$ (where $i=\sqrt{-1}$) Then $|z|$ is equal to :

(A) $\frac{\sqrt{34}}{3}$
(B) $\frac{5}{3}$
(C) $\frac{\sqrt{41}}{4}$
(D) $\frac{5}{4}$

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

Q165 JEE Main 2019 · 10 Jan · Shift 1 MCQ

Let z_1 and z_2 be any two non-zero complex numbers such that $3|z_1|=4|z_2|$. If $z=\frac{3z_1}{2z_2}+\frac{2z_2}{3z_1}$ then maximum value of $|z|$ is

Note: In actual paper value of $|z|$ was asked. Hence, none of the options given were correct. So we have modified the question as well as options.

(A) $\frac{7}{2}$
(B) $\frac{9}{2}$
(C) $\frac{5}{2}$
(D) $\frac{1}{2}\sqrt{\frac{17}{2}}$

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

Q166 JEE Main 2019 · 10 Jan · Shift 2 MCQ

Let $z = \left(\frac{\sqrt{3}}{2} + \frac{i}{2}\right)^5 + \left(\frac{\sqrt{3}}{2} - \frac{i}{2}\right)^5$. If $R(z)$ and $I(z)$ respectively denote the real and imaginary parts of z, then

(A) $I(z) = 0$
(B) $R(z) < 0$ and $I(z) > 0$
(C) $R(z) > 0$ and $I(z) > 0$
(D) $R(z) = -3$

Answer: (A) $I(z) = 0$ · Key from source paper

Q167 JEE Main 2019 · 9 Jan · Shift 1 MCQ

Let α and β be the roots of the equation $x^2 + 2x + 2 = 0$, then $\alpha^{15} + \beta^{15}$ is equal to

(A) -512
(B) 128
(C) 512
(D) -256

Answer: (D) -256 · Key from source paper

Q168 JEE Main 2019 · 9 Jan · Shift 1 MCQ

Let $A = \theta \in -\frac{\pi}{2}, \pi : \frac{3 + 2i\ \sin\theta}{1 - 2i\ \sin\theta}$ is purely imaginary . Then the sum of the elements in A is:

(A) $\frac{5\pi}{6}$
(B) π
(C) $\frac{2\pi}{3}$
(D) $\frac{3\pi}{4}$

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

Q169 JEE Main 2019 · 9 Jan · Shift 2 MCQ

Let z_0 be a root of quadratic equation, $x^2 + x + 1 = 0$. If $z = 3 + 6iz_0^{81} - 3iz_0^{93}$, then $\arg(z)$ is equal to:

(A) 0
(B) $\frac{\pi}{4}$
(C) $\frac{\pi}{6}$
(D) $\frac{\pi}{3}$

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

Q170 JEE Main 2018 · 16 Apr · Online MCQ

The least positive integer n for which $\left(\frac{1+i\sqrt{3}}{1-i\sqrt{3}}\right)^n = 1$ is

(A) 2
(B) 5
(C) 6
(D) 3

Answer: (D) 3 · Key from source paper

Q171 JEE Main 2018 · 15 Apr · Shift 1 MCQ

The set of all $\alpha \in R$, for which $w = \frac{1+(1-8\alpha)z}{1-z}$ is a purely imaginary number, for all $z \in C$ satisfying $|z| = 1$ and $\mathrm{Re}\, z \neq 1$, is

(A) $\{0\}$
(B) an empty set
(C) $\{0, \frac{1}{4}, -\frac{1}{4}\}$
(D) equal to R

Answer: (A) $\{0\}$ · Key from source paper

Q172 JEE Main 2018 · 15 Apr · Shift 2 MCQ

If $|z - 3 + 2i| \leq 4$ then the difference between the greatest value and the least value of $|z|$ is

(A) $\sqrt{13}$
(B) $2\sqrt{13}$
(C) 8
(D) $4 + \sqrt{13}$

Answer: (D) $4 + \sqrt{13}$ · Checked by our team

Q173 JEE Main 2018 · 8 Apr · Offline MCQ

If $\alpha,\ \beta \in C$ are the distinct roots of the equation $x^2 - x + 1 = 0$, then $\alpha^{101} + \beta^{107}$ is equal to

(A) 2
(B) -1
(C) 0
(D) 1

Answer: (D) 1 · Key from source paper

Q174 JEE Main 2017 · 9 Apr · Online MCQ

The equation $Im\left(\frac{iz-2}{z-i}\right)+1=0$, $z \in C$, $z \neq i$ represents a part of a circle having radius equal to :

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

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

Q175 JEE Main 2017 · 8 Apr · Online MCQ

Let $z \in C$, the set of complex numbers. Then the equation, $2|z+3i|-|z-i|=0$ represents:

(A) A circle with radius $\frac{8}{3}$
(B) An ellipse with length of minor axis $\frac{16}{9}$
(C) An ellipse with length of major axis $\frac{16}{3}$
(D) A circle with diameter $\frac{10}{3}$

Answer: (A) A circle with radius $\frac{8}{3}$ · Key from source paper

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Q176 JEE Main 2016 · 10 Apr · Online MCQ

Let $z=1+ai$, be a complex number, $a>0$, such that z^3 is a real number. Then, the sum $1+z+z^2+\ldots+z^{11}$ is equal to :

(A) $1365\sqrt{3}\,i$
(B) $-1365\sqrt{3}\,i$
(C) $-1250\sqrt{3}\,i$
(D) $1250\sqrt{3}\,i$

Answer: (B) $-1365\sqrt{3}\,i$ · Key from source paper

Q177 JEE Main 2016 · 9 Apr · Online MCQ

The point represented by $2+i$ in the Argand plane moves 1 unit eastwards, then 2 units northwards and finally from there $2\sqrt{2}$ units in the south-west wards direction. Then its new position in the Argand plane is at the point represented by :

(A) $1+i$

(B) $2+2i$

(C) $-2-2i$

(D) $-1-i$

Answer: (A) $1+i$ · Key from source paper

Q178 JEE Main 2016 · 3 Apr · Offline MCQ

A value of θ for which $\frac{2+3i\sin\theta}{1-2i\sin\theta}$ is purely imaginary, is

(A) $\sin^{-1}\left(\frac{\sqrt{3}}{4}\right)$

(B) $\sin^{-1}\left(\frac{1}{\sqrt{3}}\right)$

(C) $\frac{\pi}{3}$

(D) $\frac{\pi}{6}$

Answer: (B) $\sin^{-1}\left(\frac{1}{\sqrt{3}}\right)$ · Key from source paper

Q179 JEE Main 2015 · 11 Apr · Online MCQ

If z is a non-real complex number, then the minimum value of $\frac{Im\, z^5}{(Im\, z)^5}$ is (Where $Im\, z =$ Imaginary part of z)

(A) -2

(B) -4

(C) -5

(D) -1

Answer: (B) -4 · Key from source paper

Q180 JEE Main 2015 · 10 Apr · Online MCQ

The largest value of r, for which the region represented by the set $\{\omega \in C \mid |\omega - 4 - i| \leq r\}$ is contained in the region represented by the set $\{z \in C \mid |z-1| \leq |z+i|\}$, is equal to :

(A) $2\sqrt{2}$

(B) $\frac{3}{2}\sqrt{2}$

(C) $\sqrt{17}$

(D) $\frac{5}{2}\sqrt{2}$

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

Q181 JEE Main 2015 · 4 Apr · Offline MCQ

A complex number z is said to be unimodular if $|z| = 1$. Let z_1 and z_2 are complex numbers such that $\frac{z_1 - 2z_2}{2 - z_1\bar{z}_2}$ is unimodular and z_2 is not unimodular, then the point z_1 lies on a

(A) circle of radius $\sqrt{2}$
(B) straight line parallel to x-axis
(C) straight line parallel to y-axis
(D) circle of radius 2

Answer: (D) circle of radius 2 · Key from source paper

Q182 JEE Main 2014 · 19 Apr · Online MCQ

For all complex numbers z of the form $1 + i\alpha$, $\alpha \in R$, if $z^2 = x + iy$, then

(A) $y^2 - 4x + 4 = 0$
(B) $y^2 + 4x - 4 = 0$
(C) $y^2 - 4x + 2 = 0$
(D) $y^2 + 4x + 2 = 0$

Answer: (B) $y^2 + 4x - 4 = 0$ · Key from source paper

Q183 JEE Main 2014 · 12 Apr · Online MCQ

Let $z \neq -i$ be any complex number such that $\dfrac{z - i}{z + i}$ is a purely imaginary number. Then $z + \dfrac{1}{z}$ is:

(A) 0
(B) any non-zero real number other than 1 .
(C) any non-zero real number.
(D) a purely imaginary number.

Answer: (C) any non-zero real number. · Key from source paper

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Q184 JEE Main 2014 · 11 Apr · Online MCQ

If z_1, z_2 and z_3, z_4 are 2 pairs of complex conjugate numbers, then $\arg\left(\frac{z_1}{z_4}\right) + \arg\left(\frac{z_2}{z_3}\right)$ equals:

(A) 0
(B) $\frac{\pi}{2}$
(C) $\frac{3\pi}{2}$
(D) π

Answer: (A) 0 · Key from source paper

Q185 JEE Main 2014 · 9 Apr · Online MCQ

Let $w(Im\, w \neq 0)$ be a complex number. Then, the set of all complex numbers z satisfying the equation $w - \overline{w}z = k(1 - z)$, for some real number k, is

(A) $\{z : z \neq 1\}$
(B) $\{z : |z| = 1,\ z \neq 1\}$
(C) $\{z : z = \overline{z}\}$
(D) $\{z : |z| = 1\}$

Answer: (B) $\{z : |z| = 1,\ z \neq 1\}$ · Key from source paper

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Q186

JEE Main 2014 · 6 Apr · Offline · MCQ

If z is a complex number such that $|z| \geq 2$, then the minimum value of $\left|z + \frac{1}{2}\right|$:

(A) Is strictly greater than $\frac{5}{2}$
(B) Is strictly greater than $\frac{3}{2}$ but less than $\frac{5}{2}$
(C) Is equal to $\frac{5}{2}$
(D) Lies in the interval $(1, 2)$

Answer: (D) Lies in the interval $(1, 2)$ · Key from source paper

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Q187

JEE Main 2013 · 25 Apr · Online · MCQ

Let z satisfy $|z| = 1$ and $z = 1 - \bar{z}$. Statement 1 : z is a real number. Statement 2 : Principal argument of z is $\frac{\pi}{3}$

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

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

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Q188

JEE Main 2013 · 23 Apr · Online · MCQ

Let $a = \mathrm{Im}\left(\frac{1+z^2}{2iz}\right)$, where z is any non-zero complex number. The set $\mathrm{A} = \{a : |z| = 1 \text{ and } z \neq \pm 1\}$ is equal to:

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

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

Q189

JEE Main 2013 · 22 Apr · Online · MCQ

If a complex number z statisfies (sic) the equation $x + \sqrt{2}|z + 1| + i = 0$, then $|z|$ is equal to :

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

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

Q190 JEE Main 2013 · 9 Apr · Online MCQ

If $Z_1 \neq 0$ and Z_2 be two complex numbers such that $\frac{Z_2}{Z_1}$ is a purely imaginary number, then $\left|\frac{2Z_1 + 3Z_2}{2Z_1 - 3Z_2}\right|$ is equal to:

(A) 2
(B) 5
(C) 3
(D) 1

Answer: (D) 1 · Key from source paper

Q191 JEE Main 2013 · 7 Apr · Offline MCQ

If z is a complex number of unit modulus and argument θ, then arg $\left(\frac{1+z}{1+\bar{z}}\right)$ can be equal to (given $z \neq -1$)

(A) θ
(B) $\pi - \theta$
(C) $-\theta$
(D) $\frac{\pi}{2} - \theta$

Answer: (A) θ · Key from source paper

Q192 AIEEE 2012 · 26 May · Online MCQ

$|z_1 + z_2|^2 + |z_1 - z_2|^2$ is equal to

(A) $2\left(|z_1| + |z_2|\right)$
(B) $2\left(|z_1|^2 + |z_2|^2\right)$
(C) $|z_1|\,|z_2|$
(D) $|z_1|^2 + |z_2|^2$

Answer: (B) $2\left(|z_1|^2 + |z_2|^2\right)$ · Key from source paper

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Q193 AIEEE 2012 · 19 May · Online MCQ

Let Z and W be complex numbers such that $|Z| = |W|$, and arg Z denotes the principal argument of Z. Statement 1:If arg Z + arg $W = \pi$, then $Z = -\bar{W}$. Statement 2: $|Z| = |W|$, implies arg Z - arg

$\bar{W} = \pi$.

(A) Statement 1 is true, Statement 2 is false.

(B) Statement 1 is true, Statement 2 is true, Statement 2 is a correct explanation for Statement 1.

(C) Statement 1 is true, Statement 2 is true, Statement 2 is not a correct explanation for Statement 1.

(D) Statement 1 is false, Statement 2 is true.

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

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Q194 AIEEE 2012 · 12 May · Online MCQ

The area of the triangle whose vertices are complex numbers $z, iz, z + iz$ in the Argand diagram is

(A) $2|z|^2$

(B) $1/2|z|^2$

(C) $4|z|^2$

(D) $|z|^2$

Answer: (B) $1/2|z|^2$ · Key from source paper

Q195 AIEEE 2012 · Offline MCQ

If $z \neq 1$ and $\frac{z^2}{z-1}$ is real, then the point represented by the complex number z lies

(A) either on the real axis or on a circle passing through the origin

(B) on a circle with centre at the origin

(C) either on the real axis or on a circle not passing through the origin

(D) on the imaginary axis

Answer: (A) either on the real axis or on a circle passing through the origin · Key from source paper

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Q196 AIEEE 2011 MCQ

If $\omega(\neq 1)$ is a cube root of unity, and $(1+\omega)^7 = A + B\omega$. Then (A, B) equals

(A) $(1, 1)$

(B) $(1, 0)$

(C) $(-1, 1)$

(D) $(0, 1)$

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

Q197 AIEEE 2010 MCQ

If α and β are the roots of the equation $x^2 - x + 1 = 0$, then $\alpha^{2009} + \beta^{2009} =$

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

Answer: (B) 1 · Key from source paper

Q198 AIEEE 2010 MCQ

The number of complex numbers z such that $|z-1| = |z+1| = |z-i|$ equals

(A) 1
(B) 2
(C) ∞
(D) 0

Answer: (A) 1 · Key from source paper

Q199 AIEEE 2009 MCQ

If $\left|z - \frac{4}{z}\right| = 2$, then the maximum value of $|z|$ is equal to

(A) $\sqrt{3}+1$
(B) $\sqrt{5}+1$
(C) 2
(D) $2+\sqrt{2}$

Answer: (B) $\sqrt{5}+1$ · Key from source paper

Q200 AIEEE 2008 MCQ

The conjugate of a complex number is $\frac{1}{i-1}$. Then the complex number is

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

Answer: (C) $\frac{-1}{i+1}$ · Key from source paper

Q201 AIEEE 2007 MCQ

If $|z+4| \leq 3$, then the maximum value of $|z+1|$ is

(A) 4
(B) 10
(C) 6
(D) 0

Answer: (C) 6 · Key from source paper

Q202 AIEEE 2006 MCQ

If $z^2 + z + 1 = 0$, where z is a complex number, then the value of
$\left(z + \frac{1}{z}\right)^2 + \left(z^2 + \frac{1}{z^2}\right)^2 + \left(z^3 + \frac{1}{z^3}\right)^2 + \cdots + \left(z^6 + \frac{1}{z^6}\right)^2$

(A) 18
(B) 54
(C) 6
(D) 12

Answer: (D) 12 · Key from source paper

Q203 AIEEE 2006 MCQ

The value of $\sum_{k=1}^{10} \left(\sin \frac{2k\pi}{11} + i \cos \frac{2k\pi}{11}\right)$ is

(A) i
(B) 1
(C) -1
(D) $-i$

Answer: (D) $-i$ · Key from source paper

Q204 AIEEE 2005 MCQ

If the cube roots of unity are $1, \omega, \omega^2$ then the roots of the equation $(x-1)^3 + 8 = 0$, are

(A) $-1, -1 + 2\omega, -1 - 2\omega^2$
(B) $-1, -1, -1$
(C) $-1, 1 - 2\omega, 1 - 2\omega^2$
(D) $-1, 1 + 2\omega, 1 + 2\omega^2$

Answer: (C) $-1, 1 - 2\omega, 1 - 2\omega^2$ · Key from source paper

Q205 AIEEE 2005 MCQ

If z_1 and z_2 are two non-zero complex numbers such that $|z_1 + z_2| = |z_1| + |z_2|$ then $\arg z_1 - \arg z_2$ is equal to

(A) $\frac{\pi}{2}$
(B) $-\pi$
(C) 0
(D) $-\frac{\pi}{2}$

Answer: (C) 0 · Key from source paper

Q206 AIEEE 2005 MCQ

If $\omega = \frac{z}{z-\frac{1}{3}i}$ and $|\omega| = 1$, then z lies on

(A) an ellipse
(B) a circle
(C) a straight line
(D) a parabola.

Answer: (C) a straight line · Key from source paper

Q207 AIEEE 2004 MCQ

Let z, w be complex numbers such that $\bar{z} + i\bar{w} = 0$ and $\arg zw = \pi$. Then $\arg z$ equals

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

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

Q208 AIEEE 2004 MCQ

If $z = x - iy$ and $z^{\frac{1}{3}} = p + iq$, then $\frac{\left(\frac{x}{p}+\frac{y}{q}\right)}{(p^2+q^2)}$ is equal to

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

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

Q209 AIEEE 2004 MCQ

If $|z^2 - 1| = |z|^2 + 1$, then z lies on

(A) the real axis
(B) an ellipse
(C) a circle
(D) the imaginary axis

Answer: (D) the imaginary axis · Key from source paper

Q210 AIEEE 2003 MCQ

If z and ω are two non-zero complex numbers such that $|z\omega| = 1$ and $\text{Arg}(z) - \text{Arg}(\omega) = \frac{\pi}{2}$, then $\bar{z}\omega$ is equal to

(A) $-\text{i}$
(B) 1
(C) -1
(D) i.

Answer: (A) $-\text{i}$ · Key from source paper

Q211 AIEEE 2003 MCQ

Let Z_1 and Z_2 be two roots of the equation $x^2 + aZ + b = 0$ being complex. Further, assume that the origin, Z_1 and Z_2 form an equilateral triangle. Then

(A) $a^2 = 4b$
(B) $a^2 = b$
(C) $a^2 = 2b$
(D) $a^2 = 3b$

Answer: (D) $a^2 = 3b$ · Key from source paper

Q212 AIEEE 2003 MCQ

If $\left(\frac{1+i}{1-i}\right)^x = 1$ then

(A) $x = 2n + 1$, where n is any positive integer
(B) $x = 4n$, where n is any positive integer
(C) $x = 2n$, where n is any positive integer
(D) $x = 4n + 1$, where n is any positive integer

Answer: (B) $x = 4n$, where n is any positive integer · Key from source paper

Q213 AIEEE 2002 MCQ

z and w are two non zero complex no.s such that $|z| = |w|$ and $\text{Arg}\, z + \text{Arg}\, w = \pi$ then z equals

(A) $\overline{W}$
(B) $-\overline{W}$
(C) W
(D) -W

Answer: (B) $-\overline{W}$ · Key from source paper

Q214 AIEEE 2002 MCQ

If $|z-4| < |z-2|$, its solution is given by

(A) Re(z) > 0
(B) Re(z) < 0
(C) Re (z) > 3
(D) Re(z) > 2

Answer: (C) Re (z) > 3 · Key from source paper

Q215 AIEEE 2002 MCQ

The locus of the centre of a circle which touches the circle $|z-z_1| = a$ and $|z-z_2| = b$ externally (z, z_1 and z_2 are complex numbers) will be

(A) an ellipse
(B) a hyperbola
(C) a circle
(D) none of these

Answer: (B) a hyperbola · Key from source paper

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