MATHS

BOOKS - NDA PREVIOUS YEARS

COMPLEX NUMBERS

Multiple Choice Question

1. If z_1, z_2 are any two complex numbers such that $|z_1 + z_2| = |z_1| + z_2|$, which one of the following is correct ?

A. $z_1 = \alpha z_2 with \alpha \in R$

B. $z_1 \geq 0$ or $z_2 \geq 0$

C. $z_1 = \alpha z_2 with \alpha > 0$

D. $|z_1| = |z_2|$

Answer: A

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2. If α, β are real, what is $\left|\frac{\alpha + i\beta}{\beta + i\alpha}\right|$ equal to ?

A. 0

B. $\frac{1}{2}$

C. 1

D. 2

Answer: C

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3. If $z = 1 + I,$ then what is the inverse of z^2?

A. $2i$

B. i

C. $\frac{i}{2}$

D. $-\frac{i}{2}$

Answer: D

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4. The following question of two statements, one labelled as the 'Ass er tion (A)' and the other as 'Reason (R)' You are toe examine these two statements carefully ans select the answer.

Assertion (A): If $Z_1 = 3 + \sqrt{-16}$, and $Z_2 = 3 + \sqrt{-25}$, Z_1 / Z_2 is a complex number. Reason (R):If Z_1, Z_2 are complex numbers then Z_1 / Z_2 is always a complex number.

A. Both A and R are individually true, and R is the correct explanation of A.

B. Both A and R are individually true, and R is the correct explanation of A.

C. A is true but R is false.

D. A is false but R is true.

Answer: A

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5. Let $z = i^3(1+i)$ be a complex number. What is its argument ?

A. π

B. $\frac{\pi}{4}$

C. $-\frac{\pi}{4}$

D. $\frac{5\pi}{4}$

Answer: C

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6. Let z_1 and z_2 be two non-zero complex number such that

$$|z_1| = |z_2| = \left| \frac{1}{z_1 + \frac{1}{z_2}} \right| = 2$$

What is the value of $|z_1 + z_2|$?

A. 8

B. 4

C. 2

D. 1

Answer: A

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7. Let z be a non-zero complex number Then what is z^{-1} (multiplicative inverse of z) equal to ?

A. $\frac{\overrightarrow{z}}{|z|^2}$

B. $\frac{z}{|z|^2}$

C. $\frac{\overrightarrow{z}}{|z|}$

D. $\frac{|z|}{z}$

Answer: A

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8. Find all possible values of $\sqrt{i}+\sqrt{-i}$.

A. $\sqrt{2}$

B. 0

C. $\pm\frac{1+i}{\sqrt{2}}$

D. $\pm\frac{1-i}{\sqrt{2}}$

Answer: A

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9. What is the value of

$$\left[-1+i\sqrt{3}\right)/2\right]^{10}+\left[-1-i\sqrt{3}\right)/2\right]^{10}$$

A. 1

B. -1

C. 2

D. 0

Answer: B

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10. If ω denotes the cube root of unity, then what is the real root of the equaton $x^3-27=0$?

A. 3ω

B. $3\omega^2$

C. -3ω

D. $3\omega^3$

Answer: D

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11. Let O be the origitn and point A be represented by z. If OA is rotated throught an angle $po/2$ in the anticlockwise direction keeping the length of OA same, then what represents the new point ?

A. $-iz$

B. $|z|i$

C. iz

D. z

Answer: C

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12. If $1\omega, \omega^2$ are the three cube roots of unity, then what is $\frac{(a\omega^6 + b\omega^4 + x\omega^2)}{(b + c\omega^{10} + a\omega^8)}$ equal to ?

A. $\frac{a}{b}$

B. b

C. ω

D. ω^2

Answer: C

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13. Find the square root of the following complex number: $-5+12i$

A. $2-3i$

B. $2+3i$

C. $-2+3i$

D. $\sqrt{-5}+\sqrt{12i}$

Answer: B

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14. If $\alpha\frac{1+i\sqrt{3}}{2}$, then what is the value of $1+\alpha^8+\alpha^{16}+\alpha^{24}+\alpha^{32}$?

A. 0

B. 1

C. ω

D. $-\omega^2$

Answer: D

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15. A straight line is passing through thte points represented by the complex number a+ ib and $\frac{1}{-1+ib}$, where $(a, b) \neq (0, 0)$.

Which one of the following is correct ?

A. It passes thro ugh the origin

B. It is parallel to the x-axis

C. It is parallel to the y-axis

D. It parallel to the y-axis

Answer: A

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16. Which one of the following is correct? Ifz and w are complex numbers and $\bar{w}$ denotes the conjugate of w, then $|z+w| = |z-w|$ holds only, if

A. $z = 0 \text{ or } w = 0$

B. $z = 0 \text{ and } w = 0$

C. $z.\overrightarrow{w}$ is purely real

D. w is purely imaginary

Answer: A

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17. What is the square root of $\frac{1}{2} - i\frac{\sqrt{3}}{2}$?

A. $\pm\left(\frac{\sqrt{3}}{2} + \frac{i}{2}\right)$

B. $\pm\left(\frac{\sqrt{3}}{2} - \frac{i}{2}\right)$

C. $\pm\left(\frac{1}{2} - \frac{\sqrt{3}}{2}\right)$

D. $\pm\left(\frac{1}{2} + i\frac{\sqrt{3}}{2}\right)$

Answer: A

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18. Let C be the set of complex number and z_1, z_2 are in C.

1. agr $(z_1) = agr(z_2) \Rightarrow z_1 = z_2$

2. $|z_1| = |z_2| \Rightarrow z_1 = z_2$

Which of the statements givben above is/are correct?

A. 1only

B. 2 only

C. Both 1 and 2

D. neither 1 nor 2

Answer: D

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19. What is agr (bi) where $b > 0$?

A. 0

B. $\frac{\pi}{2}$

C. π

D. $\frac{3\pi}{2}$

Answer: B

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20. If ω is a complex non-real cube root of unity, then ω satisfies which one of the following equations ?

A. $x^2 - x + 1 = 0$

B. $x^2 + x + 1 = 0$

C. $x^2 + x - 1 = 0$

D. $x^2 - x - 1 = 0$

Answer: B

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21. For a positive integer n, what is the value of i^{4n+1} ?

A. 1

B. -1

C. It is parallel to the y-axis

D. $-i$

Answer: C

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22. If ω is a complex cube root of unity, then what is the value of $1 - \frac{1}{(1+\omega)} - \frac{1}{(1+\omega^2)}$?

A. 1

B. 0

C. ω

D. ω^2

Answer: B

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23. match List I which List II ans select the correct answer using to code given below the lists

List I		List II	
$A.$	A cube root of unity	1.	$-2(1+i)$
$B.$	A square root of -1	2.	$2i$
$C.$	Cube of 1-i	3.	$2i$
$D.$	Square of 1+i	4.	$-\frac{1}{2}\left(1+i\sqrt{3}\right)$

A.
A	B	C	D
4	1	3	2

B.
A	B	C	D
2	1	3	4

C.
A	B	C	D
4	3	1	2

D.
A	B	C	D
2	3	1	4

Answer: C

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24. What is $\left(\sqrt{3}+i\right)/\left(1+\sqrt{3}i\right)$ equal to ?

A. $1+i$

B. $1 - i$

C. $\sqrt{3}(1 - i)/2$

D. $\left(\sqrt{3} - i\right)/2$

Answer: D

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25. If $2x = 3 + 5i$, then what is the value of $2x^3 + 2x^2 - 7x + 72$?

A. 4

B. -4

C. 8

D. -8

Answer: A

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26. Assertion (A):

$$\left(\frac{-1+\sqrt{-3}}{2}\right)^{29}+\left(\frac{-1-\sqrt{-3}}{2}\right)^{29}=-1$$

Reason (R) $\omega^2=-1$

A. Both A and R are true and R is the correct explanation of A

B. Both A and R are true but R is not the correct explanation of A

C. A is true but R is false.

D. A is false but R is true.

Answer: C

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27. If α is a complex number such that $\alpha^2 + \alpha + 1 = 0,$ then what is α^{31} equal to ?

A. α

B. α^2

C. 0

D. 1

Answer: A

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28. What is the modulus of $\left|\frac{1+2i}{1-(1-i)^2}\right|$?

A. 5

B. 4

C. 3

D. 1

Answer: D

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29. What is the value of $\left(-\sqrt{-1}\right)^{4n+3}+\left(i^{41}+1^{-257}\right)^9$, when n inN` ?

A. 0

B. 1

C. It is parallel to the y-axis

D. $-i$

Answer: C

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30. If ω is the cube root of unity, then what is the con jugate of $2\omega^2 + 3i$?

A. $2\omega - 3i$

B. $3\omega + 2i$

C. $2\omega + 3i$

D. $3\omega - 2i$

Answer: A

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31. If z is a complex number such that $z + z^{-1} = 1,$ then what is the value of $z^{99} + z^{-99}$?

A. 1

B. -1

C. 2

D. -2

Answer: D

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32. What is the value of $\left(\frac{i+\sqrt{3}}{-i+\sqrt{3}}\right)^{200}+\left(\frac{i-\sqrt{3}}{i+\sqrt{3}}\right)^{200}+1$?

A. -1

B. 0

C. 1

D. 2

Answer: B

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33. If ω is complex cube root of unity ans $x=\omega^2-\omega-2$, then what is the vlaue of x^2+4x+7 ?

A. -2

B. -1

C. 0

D. 1

Answer: C

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34. If $x^2 + y^2 = 1$, then what is $\frac{1 + x + iy}{1 + x - iy}$ equal to ?

A. $x - iy$

B. $x + iy$

C. $2x$

D. $-2it$

Answer: B

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35. What is the modulus of $\left|\frac{1+2i}{1-(1-i)^2}\right|$?

A. 1

B. $\sqrt{5}$

C. $\sqrt{3}$

D. 5

Answer: A

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36. What is the least positive integer n for which $\left(\frac{1+i}{1-i}\right)^n = 1$?

A. 16

B. 12

C. 8

D. 4

Answer: D

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37. What is the conjugate of $\left(\frac{1+2i}{2+i}\right)^2$?

A. $\frac{7}{25} + i\frac{24}{25}$

B. $-\frac{7}{25}-i\frac{24}{25}$

C. $-\frac{7}{25}+i\frac{24}{25}$

D. $\frac{7}{25}-i\frac{24}{25}$

Answer: D

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38. What is $\left(\frac{\sqrt{3}+i}{\sqrt{3}-i}\right)^6$ equal to ?

A. -1

B. 0

C. 1

D. 2

Answer: C

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39. If ω is a complex cube root of unity, then what is $\omega^{10} + \omega^{-10}$ equal to ?

A. 2

B. -1

C. -2

D. 1

Answer: B

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40. What is the value of $\left(-1+i\sqrt{3}\right)^{48}$?

A. 1

B. 2

C. 2^{24}

D. 2^{48}

Answer: D

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41. What is the vlaue of

$1+i^2+i^4+i^{60}+\ldots.+i^{100}$, where $i=\sqrt{-1}$?

A. 0

B. 1

C. -1

D. None of these

Answer: B

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42. If $z = 1 + \cos\left(\frac{\pi}{5}\right) + i\sin\left(\frac{\pi}{5}\right)$ then $\sin(argz)$ is equal to

A. $2\cos\frac{\pi}{5}$

B. $2\sin\frac{\pi}{10}$

C. $2\cos\frac{\pi}{10}$

D. $2\sin\frac{\pi}{10}$

Answer: C

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43. What is modulus of $\frac{1}{1+3i} - \frac{1}{1-3i}$?

A. $\frac{3}{5}$

B. $\frac{9}{25}$

C. $\frac{3}{25}$

D. $\frac{5}{3}$

Answer: A

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44. If ω is the imaginary cube root of unity, then what is $\left(2-\omega+2\omega^2\right)^{27}$ equal to ?

A. $3^{27}\omega$

B. $-3^{27}\omega^2$

C. 3^{27}

D. -3^{27}

Answer: D

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45. What is the value of $(1+i)^5-(1-i)^5$, where $i=\sqrt{-1}$?

A. -8

B. 8

C. $8i$

D. $-8i$

Answer: A

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46. What are the square roots of $-2i$?

$(i = \sqrt{-1})$

A. $\pm(1+i)$

B. $\pm(1-i)$

C. $\pm i$

D. ± 1

Answer: B

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47. If $z = 1 + i\tan\alpha where \pi < \alpha < \frac{3\pi}{2}$, then what is $|z|$ equal to ?

A. $\sec\alpha$

B. $-\sec\alpha$

C. $\sec^2\alpha$

D. $-\sec^2\alpha$

Answer: B

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48. The smallest positive integral value of n for which $\left(\frac{1-i}{1+i}\right)^n$ is purely imaginary with positive imaginary part is

A. 1

B. 3

C. 4

D. 5

Answer: B

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49. If α and β are the complex cube roots of unity, then what is the vlaue of $(1+\alpha)(1+\beta)\left(1+\alpha^2\right)\left(1+\beta^2\right)$?

A. -1

B. 0

C. 1

D. 4

Answer: C

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50. If p,q,r are positive integers and ω is the cube root of unity and $f(x) = x^{3p} + x^{31+1}x^{3r+2}$, then what is $f(\omega)$ equal to ?

A. ω

B. $-\omega^2$

C. $-\omega$

D. 0

Answer: D

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51. If $z = \frac{1+2i}{2-i} - \frac{2-i}{1+2i}$, then what is the value of $z^2 + z\bar{z}$ $(i = \sqrt{-1})$

A. 0

B. -1

C. 1

D. 8

Answer: A

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52. What is the argument of $(1 - \sin\theta) + i\cos\theta$?

$(i = \sqrt{-1})$

A. $\frac{\pi}{2} - \frac{\theta}{2}$

B. $\frac{\pi}{2}+\frac{\theta}{2}$

C. $\frac{\pi}{4}-\frac{\theta}{2}$

D. $\frac{\pi}{4}+\frac{\theta}{2}$

Answer: D

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53. If $A+iB=\frac{4+2i}{1-2i}wherei=\sqrt{-1}$ then what is the vlue of A ?

A. -8

B. 0

C. 4

D. 8

Answer: B

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54. If $z = -\bar{z}$, then which one of the following is correct?

A. real part of z is zero.

B. The imaginary part of z is zero.

C. The real part of z is equal to imaginary

D. The sum of real and imaginary parts of z is z.

Answer: A

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55. Consider the following statements :

1. $\left(\omega^{10}+1\right)^{7}+\omega=0$

2. $\left(\omega^{105}+1\right)^{10}=p^{10}$ for some prime number p where $\omega \neq 1$ is a cube root of unity.

Which of the above statements is/are correct ?

A. 1 only

B. 2 only

C. Both 1 and 2

D. neither 1 nor 2

Answer: B

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56. The value of the sum $\sum_{n=1}^{13}\left(i^n+i^{n+1}\right) where i=\sqrt{-1}$ is:

A. i

B. $-i$

C. 0

D. $i-1$

Answer: D

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57. What is the modulus of $\frac{\sqrt{2}+i}{\sqrt{2}-i} where i=\sqrt{-1}$?

A. 3

B. 43467

C. 1

D. None of the above

Answer: C

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58. What is $\sqrt{-10 where I = \sqrt{-1}}$ equal to ?

A. $\pm \frac{1-i}{\sqrt{2}}$

B. $\pm \frac{1+i}{\sqrt{2}}$

C. $\pm \frac{1-i}{2}$

D. $\pm \frac{1+i}{2}$

Answer: A

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59. What is the argument of the complex number $(-1-i)$ where $i=\sqrt{-1}$?

A. $\frac{5\pi}{4}$

B. $-\frac{5\pi}{4}$

C. $\frac{3\pi}{4}$

D. None of the above

Answer: A

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60. What is one of the square roots of $3+4i$, where $i=\sqrt{-1}$?

A. $2 + i$

B. $2 - i$

C. $-2 + i$

D. $-3 - i$

Answer: A

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61. If P and Q are two compex numbers, then the modulus of the quotient of P ans Q is :

A. Greater than the quotient of their moduli

B. Less than the quotient of their moduli

C. Less than or equal to the quotient of their moduli

D. Equal to the quotient of their moduli

Answer: D

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62. Let $z = x + iy$ where x,y are real variable $i = \sqrt{-1}$. If $|2z - 1| = |z - 2|$,then the point z describ es :

A. A circle

B. An ellipse

C. A hyperbola

D. A parabola

Answer: A

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63. If $|z+\bar{z}| = |z-\bar{z}|$ then locus of z is

A. A pair of straight lines

B. A line

C. A set of four straight lines

D. A circle

Answer: A

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64. What is the arugument of the complex number $\frac{(1+i)(2+i)}{3-i}$ where $= \sqrt{-1}$?

A. 0

B. $\frac{\pi}{4}$

C. $-\frac{\pi}{4}$

D. $\frac{\pi}{2}$

Answer: D

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65. If z is a complex number such that $|z| = 4$ and $arg(z) = \frac{5\pi}{6}$ then z is equal to

A. $2\sqrt{3} + 2i$

B. $2\sqrt{3} - 2i$

C. $-2\sqrt{3} + 2i$

D. $-\sqrt{3} + i$

Answer: C

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66. What is $\frac{(1+i)^{4n+5}}{(1-i)^{4n+3}}$ equal to, where n is a natural number and $i = \sqrt{-1}$?

A. 2

B. 2i

C. -2

D. i

Answer: A

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67. If $z = \frac{-2(1+2i)}{3+i}$ where $i = \sqrt{-1}$ then argument $\theta(-\pi < \theta \leq \pi)$ of z is

A. $\frac{3\pi}{4}$

B. $\frac{\pi}{4}$

C. $\frac{5\pi}{6}$

D. $-\frac{3\pi}{4}$

Answer: D

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68. If $1, \omega, \omega^2$ are the cube roots of unity, then the value of $(1+\omega)(1+\omega^2)(1+\omega^4)(1+\omega^8)$ is

A. -1

B. 0

C. 1

D. 2

Answer: C

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69. What is the square root of i, where $i = \sqrt{-1}$?

A. $\frac{1+i}{2}$

B. $\frac{1-i}{2}$

C. $\frac{1+i}{\sqrt{2}}$

D. None of these

Answer: C

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70. $\left(x^3-1\right)$ can be fa ctorised as

A. $(x-1)(x-\omega)\left(x+\omega^2\right)$

B. $(x-1)(x-\omega)\left(x-\omega^2\right)$

C. $(x-1)(x+\omega)\left(x+\omega^2\right)$

D. $(x-1)(x+\omega)\left(x-\omega^2\right)$

Answer: B

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71. What is $\left[\frac{\frac{\sin(\pi)}{6}+i\left(1-\cos\left(\frac{\pi}{6}\right)\right)}{\frac{\sin(\pi)}{6}-\left(1-\cos\left(\frac{\pi}{6}\right)\right)}\right]^3$ where $i=\sqrt{-1}$ equal to

A. 1

B. -1

C. i

D. $-i$

Answer: C

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72. What is the real part of $(\sin x+i\cos x)^3$ where $i=\sqrt{-1}$?

A. $-\cos 3x$

B. $-\sin 3x$

C. $\sin 3x$

D. $\cos 3x$

Answer: B

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73. If z_1 and z_2 are complex number with $|z_1| - |z_2|$, then which of the following is/are correct?

1.$z_1 = z_2$

2. Real part of z_1 = Real part of z_2

3. Imaginary part of z_1 = Imaginary part of z_2

Select the correct answer using the code given below :

A. 1 only

B. 2 only

C. 3 only

D. None

Answer: D

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74. if the point $z_1 = 1 + i$ where $i = \sqrt{-1}$ is the reflection of a point $z_2 = x + iy$ in the line $i\bar{z} - iz = 5$ then the point z_2 is

A. $1 + 4i$

B. $4 + i$

C. $1 - i$

D. $-1-i$

Answer: A

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75. $z\bar{z}+(3-i)z+(3+i)\bar{z}+1=0$ represents a circle with

A. centre $(-3,-1)$ and redius 3

B. centre $(-3,1)$ and radius 3

C. centre $(-3,-1)$ and radius 4

D. centre $(-3,1)$ and radius 4

Answer: A

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76. Suppose w is a cube root of unity with $\omega \neq 1$. Suppose P and Q are the points on the complex plane defined by $\omega \text{ and } \omega^2$. If O is the origin, then what is the angle between OP and OQ?

A. 60°

B. 90°

C. 120°

D. 150°

Answer: C

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77. If $z = x + iy = \left(\frac{1}{\sqrt{2}} - \frac{i}{\sqrt{2}}\right)^{-25}, where i = \sqrt{-1},$ then what is the fundamental amplitude of $\frac{z - \sqrt{2}}{z - \sqrt{2}}$?

A. π

B. $\frac{\pi}{2}$

C. $\frac{\pi}{3}$

D. $\frac{\pi}{4}$

Answer: A

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78. Let z_1, z_2 and z_3 be non-zero complex numbers satisfying $z^2 = \overline{iz}, where i = \sqrt{-1}.$

What is $z_1 + z_2 + z_3$ equal to ?

A. i

B. $-i$

C. 0

D. 1

Answer: C

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79. Let z_1, z_2 and z_3 be non-zero complex numbers satisfying $z^2 = \overline{iz}, where i = \sqrt{-1}.$

Consider the following statements:

1. $z_1 z_2 z_3$ is purely imaginary.

2. $z_1 z_2 + z_2 z_3 + z_3 z_1$ is purely real.

Which of the above statements is/are correct?

A. 1 only

B. 2 only

C. Both 1 and 2

D. neither 1 nor 2

Answer: C

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80. Let z be a complex number satisfying

$$\left|\frac{z-4}{z-8}\right| = 1 \text{ and } \left|\frac{z}{z-2}\right| = \frac{3}{2}$$

What is $|z|$ equal to ?

A. 6

B. 12

C. 18

D. 36

Answer: A

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81. Let z be a complex number satisfying

$$\left|\frac{z-4}{z-8}\right| = 1 \text{ and } \left|\frac{z}{z-2}\right| = \frac{3}{2}$$

What is $\left|\frac{z-6}{z+6}\right|$ equal to ?

A. 3

B. 2

C. 1

D. 0

Answer: D

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82. Suppose ω_1 and ω_2 are two distinct cube roots of unity different from 1. Then what is $(\omega_1 - \omega_2)^2$ equal to ?

A. 3

B. 1

C. -1

D. -3

Answer: D

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83. What is $\omega^{100} + \omega^{200} + \omega^{300}$ equal to, where ω is the cube root of unity?

A. 1

B. 3ω

C. $3\omega^2$

D. 0

Answer: D

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84. If $\text{Re}\left(\frac{z-1}{z+1}\right) = 0$ where $z = x + iy$ is a complex number, then which one of the following is correct? (a) $z = 1 + i$ (b) $|z| = 2$. (c) $z = 1 - i$

A. $z = 1 = i$

B. $|z| = 2$

C. $z = 1 - i$

D. $|z| = 1$

Answer: D

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85. If $z = \left(\frac{\sqrt{3}}{2} + \frac{i}{2}\right)^{107} + \left(\frac{\sqrt{3}}{2} - \frac{i}{2}\right)^{107}$, then what is the imaginary pary of z equal to?

A. 0

B. $\frac{1}{2}$

C. $\frac{\sqrt{3}}{2}$

D. 1

Answer: A

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86. What is the number of distinct solutions of the equation $z^2 + |z| = 0$ (where z is a complex number)? (a) One (b) Two (c) Three (d) Five

A. One

B. Two

C. Three

D. Five

Answer: C

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87. What is $\sqrt{\frac{1+\omega^2}{1+\omega}}$ equal to, where ω is the cube root of unity ?

A. 1

B. ω

C. ω^2

D. $i\omega where i = \sqrt{-1}$

Answer: B

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88. The value of $i^{2n} + i^{2n+1} + i^{2n+2} + i^{2n+3}$, where $i = \sqrt{-1}$, is

A. 0

B. 1

C. i

D. $-i$

Answer: A

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89. What is the value of $\left(\frac{1 = \ - \ + i\sqrt{3}}{2}\right)^{3n} + \left(\frac{-1 + i\sqrt{3}}{2}\right)^{3n} wherei = \sqrt{-1}$?

A. 1

B. -1

C. i

D. $-i$

Answer: B

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90. The modulus and principle argument of the complex number $\frac{1+2i}{1-(1-i)^2}$ are respectively

A. $1, 0$

B. $1, 1$

C. $2, 0$

D. $2, 1$

Answer: A

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

A. 0

B. 4

C. 6

D. 10

Answer: C

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92. The number of roots of the equation $z^2 = 2\bar{z}$ is

A. 2

B. 3

C. 4

D. zero

Answer: C

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93. If $A = \begin{bmatrix} 4i-6 & 10i \\ 14i & 6+4i \end{bmatrix}$ and $k\frac{1}{ki}, where i - \sqrt{-1},$ then kA is equal to

A. $\begin{bmatrix} 2+3i & 5 \\ 7 & 2-3i \end{bmatrix}$

B. $\begin{bmatrix} 2-3i & 5 \\ 7 & 2+3i \end{bmatrix}$

C. $\begin{bmatrix} 2-3i & 7 \\ 5 & 2+3i \end{bmatrix}$

D. $\begin{bmatrix} 2+3i & 5 \\ 7 & 2+3i \end{bmatrix}$

Answer: A

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94. The smallest positive integer n for which $\left(\frac{1+i}{1-i}\right)^n = i$ is

8 (b) 16 (c) 12 (d) None of these

A. 1

B. 4

C. 6

D. 16

Answer: B

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95. Geometrically $Re\left(z^2 - i\right) = 2, where i = \sqrt{-1}$ and Re is the real part, represents.

A. circle

B. ell ipse

C. rectangular hyperbola

D. parabola

Answer: C

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96. What is the principal argument of $(-1-i)$, where $i=\sqrt{-1}$?

A. $\frac{\pi}{4}$

B. $-\frac{\pi}{4}$

C. $-\frac{3\pi}{4}$

D. $\frac{3\pi}{4}$

Answer: C

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97. Let α and β be real numbers and z be a complex number. If $z^2+\alpha z+\beta=0$ has two distinct non-real roots with Re(z)=1, then it is necessary that

A. $\beta \in (-1, 0)$

B. $|\beta| = 1$

C. $\beta \in (1, \infty)$

D. $\beta \in (0, 1)$

Answer: C

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98. The number of non-zero integral sol ution of the e quation $|1 - 2i^x = 5^x$ is

A. Zero (No solution)

B. One

C. Two

D. Three

Answer: A

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99. If α and β Are different complex number with $|\alpha| = 1$, then what is $\left|\frac{\alpha - \beta}{1 - \alpha\beta}\right|$ equal to ?

A. $|\beta|$

B. 2

C. 1

D. 0

Answer: C

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100. What is $i^{100} + i^{1001} + i^{1002} + i^{1003}$ equal to (where $i = \sqrt{-1}$) ?

A. 0

B. i

C. $-i$

D. 1

Answer: A

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101. The modulus -amplitude from of $\sqrt{3} + i, where\ i = \sqrt{-1}$ is

A. $2\left(\cos\frac{\pi}{3}+i\sin\frac{\pi}{3}\right)$

B. $2\left(\cos\frac{\pi}{6}+i\sin\frac{\pi}{6}\right)$

C. $2\left(\cos\frac{\pi}{3}-i\sin\frac{\pi}{3}\right)$

D. $2\left(\cos\frac{\pi}{6}-i\sin\frac{\pi}{6}\right)$

Answer: B

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102. What is the value of the sum $\sum_{n=2}^{11}\left(i^n+i^{n+1}\right), where i=\sqrt{-1}$?

A. i

B. $2i$

C. $-2i$

D. $1+i$

Answer: C

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103. What is the value of $\left(\frac{1=\ -\ +i\sqrt{3}}{2}\right)^{3n}+\left(\frac{-1+i\sqrt{3}}{2}\right)^{3n} wherei=\sqrt{-1}$?

A. 3

B. 2

C. 1

D. 0

Answer: B

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104. Which one of the following is correct in respect of the cube roots of unity?

A. They are collinear

B. They lie on a circle of radius $\sqrt{3}$

C. They form an equilateral triangle

D. None of the above

Answer: C

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105. If

$A = \{x \in Z : x^2 - 1 = 0\}$ and $B = \{x \in Z : x^2 + x + 1 = 0\}$,

where Z is set of complex numbers, then what is $A \sum B$ equal to ?

A. Null set

B. $\left\{\frac{-1+\sqrt{3}i}{2}, \frac{1-\sqrt{3}i}{2}\right\}$

C. $\left\{\frac{-1+\sqrt{3}i}{4}, \frac{-1-\sqrt{3}i}{4}\right\}$

D. $\left\{\frac{1+\sqrt{3}i}{2}, \frac{1-\sqrt{3}i}{2}\right\}$

Answer: B

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106. If $\begin{bmatrix} x & -3 & 1 \\ y & 1 & i \\ 0 & 2i & -i \end{bmatrix} = 6 + 11i,$ then what are the value of x and y respectively ?

A. $-3, 4$

B. $3, 4$

C. $3, \ -4$

D. $-3, \ -4$

Answer: A

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107. The common roots of the equations $z^3 + 2x^2 + 2z + 1 = 0$ and $z^{2017} + z^{2018} + 1 = 0$ are

A. $-1, \omega$

B. $1, \omega^2$

C. $-1, \omega^2$

D. ω, ω^2

Answer: B

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108. A complex number is given by $z = \frac{1+2i}{1-(1-i)^2}$

What is the modulus of z ?

A. 4

B. 2

C. 1

D. $\frac{1}{2}$

Answer: C

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109. A complex number is given by $z = \dfrac{1+2i}{1-(1-i)^2}$

What is the principal argument of z?

A. 0

B. $\dfrac{\pi}{4}$

C. $\dfrac{\pi}{2}$

D. π

Answer: A

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