MATHS

BOOKS - HIMALAYA MATHS (KANNADA ENGLISH)

COMPLEX NUMBERS

Question Bank

1. The smallest positive integer n for which $(1+i)^n$ is purely imaginary is

A. 4

B. 2

C. 8

D. 6

Answer: B

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2. If $z_1 = \sqrt{3} + i\sqrt{3}$ and $z_2 = \sqrt{3} + i$ then the complex number $\left(\frac{z_1}{z_2}\right)$ lies in the

A. I quadrant

B. II quadrant

C. III quadrant

D. IV quadrant

Answer: A

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3. Evaluate $(1+i)^6 + (1-i)^3$

A. $2+i$

B. $2-10i$

C. $-2+i$

D. $-2-10i$

Answer: D

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4. If $i^2 = -1$ then $i+i^2+i^3+\ldots\ldots.$ upto 1000 terms is equal to

A. 1

B. -1

C. 0

D. -i

Answer: C

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5. If $\dfrac{i^4+i^9+i^{26}}{2-i^8+i^{10}-i^{15}}=A+iB$ then $(A, B)=$

A. (2,1)

B. (2,-1)

C. (1,0)

D. (1,-2)

Answer: C

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6. The value of $\left(\dfrac{1+i}{1-i}\right)^{4n}=$

A. -1

B. -i

C. i

D. 1

Answer: D

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7. If n is any positive integer then the value of $\frac{i^{4n+1} - i^{4m-1}}{2} =$

A. 1

B. -1

C. i

D. -i

Answer: C

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8. If $n = 4m + 3$, m is an integer then $i^n =$

A. i

B. -i

C. -1

D. 1

Answer: B

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9. If $\left(\frac{1+i}{1-i}\right)^3-\left(\frac{1-i}{1+i}\right)^3=x+iy$ then $(x, y)=$

A. (0,2)

B. (-2,0)

C. (0,-2)

D. none of these

Answer: C

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10. $(1+i)^{2n}+(1-i)^{2n}, n \in z$ is

A. a purely imaginary number

B. a purely real number

C. a non real complex number

D. a complex number z, such that $Re\ z = Imz$

Answer: B

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11. If $(a+ib)^5 = \alpha + i\beta$ then $(b+ia)^5 =$

A. 1)$\beta + i\alpha$

B. 2)$\alpha - i\beta$

C. 3)$\beta - i\alpha$

D. 4)$-\alpha - i\beta$

Answer: A

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12. The multiplicative inverse of $\frac{1+i}{1-i}$ is

A. 1+i

B. 1-i

C. i-1

D. -i

Answer: D

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13. Let $z = x + iy$ then $z.\bar{z} = 0$ if and only if

A. Re z=0

B. z=0

C. Im z=0

D. z = -1

Answer: B

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14. If $x+iy=\frac{1}{1+\cos\theta+i\sin\theta}$ then x^2

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

B. $\frac{1}{3}$

C. $\frac{1}{4}$

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

Answer: C

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15. Imaginary part of $\frac{1}{1+\cos\theta-i\sin\theta}$ is

A. $2\tan\left(\frac{\theta}{2}\right)$

B. $-\frac{1}{2}\frac{\tan(\theta)}{2}$

C. $-\cos ec\theta$

D. $\frac{1}{2}\tan\left(\frac{\theta}{2}\right)$

Answer: D

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16. The real part of $\frac{1}{1-\cos\theta+i\sin\theta}$ is

A. $\frac{1}{1-\cos\theta}$

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

C. $\frac{\tan(\theta)}{2}$

D. $\frac{1}{4}$

Answer: B

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17. If α is a complex number such that $\alpha^2 + \alpha + 1 = 0$ then α^{31} is

A. α

B. α^2

C. 0

D. 1

Answer: A

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18. If $3 + ix^2y$ and $x^2 + y + 4i$ are conjugate complex numbers then $x^2 + y =$

A. 1

B. 2

C. 3

D. 4

Answer: C

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19. Conjugate of $(1+2i)(2-3i)$ is

A. -4+i

B. -4-i

C. 8+i

D. 8-i

Answer: D

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20. The conjugate of the complex number $(1+i)^3 + \frac{1}{i}$ is

A. 1)-2-i

B. 2)1+2 i

C. 3)i+2

D. 4)3 i+2

Answer: A

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21. The conjugate of $\frac{2-3i}{3+4i}$ is

A. 1) $\frac{6-17i}{25}$

B. 2) $\frac{-6+17i}{25}$

C. 3) $-\frac{6-17i}{25}$

D. 4)none of these

Answer: D

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22. The modulus of $\dfrac{\sqrt{3}+i}{(1+i)\left(1+\sqrt{3}i\right)}$ is

A. 2

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

C. $\sqrt{2}$

D. $\dfrac{1}{\sqrt{2}}$

Answer: D

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23. The modulus of $\dfrac{(3+i)(2-i)}{1+i}$ is

A. 5

B. $\sqrt{5}$

C. $5\sqrt{2} -$

D. $\dfrac{\sqrt{5}}{\sqrt{2}}$

Answer: A

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24. $\left|\dfrac{1}{(2+i)^2} - \dfrac{1}{(2-i)^2}\right|$

A. $\dfrac{\sqrt{8}}{5}$

B. $\dfrac{8}{25}$

C. $\dfrac{25}{8}$

D. none of these

Answer: B

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25. If $|z_1| = |z_2| = \ldots\ldots. = |z_n| = 1$ then $|z_1 + z_2 + . + z_n| =$

A. $\left|\frac{1}{z_1} + \frac{1}{z_2} + \ldots. + \frac{1}{z_n}\right|$

B. $\left|\frac{1}{z_1} - \frac{1}{z_2} + \frac{1}{z_3} \ldots + \frac{1}{z_n}\right|$

C. $\left|\frac{1}{z_1^2} + \frac{1}{z_1^2} \ldots + \frac{1}{z_n^2}\right|$

D. none of these

Answer: A

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26. If z_1, z_2, z_3 are complex numbers such that : $|z_1| = |z_2| = |z_3| = \left|\frac{1}{z_1} + \frac{1}{z_2} + \frac{1}{z_3}\right| = 1$, then $|z_1 + z_2 + z_3|$ is equal to

A. 1

B. less than1

C. greater than 1

D. equal to 13

Answer: A

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27. The amplitude of $(-1)^5$ is

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

B. π

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

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

Answer: B

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28. Find the amplitude of $-\frac{1}{2}+I, \frac{\sqrt{3}}{2}$

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

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

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

D. π

Answer: C

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29. The amplitude of the conjugate of $\frac{1+i}{1-i}$ is

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

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

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

D. π

Answer: A

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30. The amplitude of $\dfrac{1+i\sqrt{3}}{\sqrt{3}+i}$

A. $\dfrac{\pi}{3}$

B. $\dfrac{\pi}{6}$

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

D. none of these

Answer: B

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31. The amplitude of $(-1)^5 i$ is

A. $-\pi$

B. π

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

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

Answer: D

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32. The amplitude of $\frac{1+i}{1+\sqrt{3}i}$ is

A. a. $\frac{\pi}{12}$

B. b. $-\frac{\pi}{12}$

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

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

Answer: B

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33. $-1 + i\sqrt{3} = re^{i\theta}$ then $\theta =$

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

B. $-\frac{2\pi}{3}$

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

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

Answer: A

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34. The modulus and amplitude of $e^{\left(2 + i\frac{\pi}{3}\right)}$ is

A. e^2 and $\frac{\pi}{3}$

B. e^2 and $\frac{2\pi}{3}$

C. $e^{\sqrt{2}}$ and $\frac{\pi}{3}$

D. $\sqrt{e}$ and $\frac{\pi}{3}$

Answer: A

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35. If $|z_1| = |z_2|$ and arg z_1 + arg $z_2 = 0$ then

A. $z_1 = z_2$

B. $z_2 = \bar{z}_1$

C. $z_1 + z_2 = 0$

D. $\bar{z}_1 = \bar{z}_2$

Answer: B

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36. Let z and w be two non-zero complex numbers such that $|z| = |w|$ and arg.(z) + arg.$(w) = \pi$. Then z equals :

A. z_2

B. $-z_2$

C. $\bar{z}_2$

D. $-\bar{z}_2$

Answer: D

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37. Let z be a complex number such that |z| = 4 and arg (z) $= 5\pi/6,$ then z =

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

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

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

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

Answer: A

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38. The locus of the point satisfying the condition amp. $\left(\frac{z-1}{z+1}\right)=\frac{\pi}{3}$ is

A. a line through the origin

B. circle

C. parabola

D. a line not through the origin

Answer: B

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39. The complex number z which satisfies the Equation $\left|\frac{i+z}{i-z}\right|=1$ lies on

A. 1)a circle $x^2+y^2=1$

B. 2)the x -axis

C. 3)the y -axis

D. 4)the line $x + y = 1$

Answer: B

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40. If z_1 and z_2 are complex number and $\frac{z_1}{z_2}$ is purely imaginary then $\left|\left(\frac{z1 + z2}{z1 - z2}\right)\right| =$

A. a)1

B. b)2

C. c)3

D. d)4

Answer: A

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41. If $|z| = 1$ and $w = \dfrac{z-1}{z+1}$ (where $z \neq -1$), then $Re(w)$ is :

A. 1

B. 2

C. 3

D. 5

Answer: A

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42. If the complex number $\dfrac{1 - i\sin\theta}{1 + 2i\sin\theta}$ is purely imaginary, then the principal value of θ is

A. $\pm\dfrac{\pi}{3}$

B. $\pm\dfrac{\pi}{6}$

C. $\pm\dfrac{3\pi}{4}$

D. $\pm\dfrac{\pi}{4}$

Answer: D

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43. The complex numbers z_1, z_2, z_3 are three vertices of a parallelogram taken in order then the fourth vertex is

A. $\frac{1}{2}(z_1 + z_2)$

B. $\frac{1}{4}(z_1 + z_2 + z_3 + z_4)$

C. $\frac{1}{2}(z_1 + z_2 + z_3)$

D. $z_1 - z_2 + z_3$

Answer: D

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44. The complex numbers $1, -1, i\sqrt{3}$ form

A. 1)a angled triangle

B. 2)an isosceles triangle

C. 3)an equilateral triangle

D. 4)an isosceles angled triangle

Answer: C

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45. If $x = cisA, y = cisB, z = cisC$ where A, B, C are the angles of a triangle then x y z=

A. 0

B. -1

C. 1

D. none of these

Answer: B

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46. The value of $\left(\frac{1+i}{\sqrt{2}}\right)^{8}+\left(\frac{1-i}{\sqrt{2}}\right)^{8}=$

A. 1

B. -1

C. 2

D. 0

Answer: C

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47. If $x=-1-i\sqrt{3}$ then the value of x^{3} is

A. A: 8

B. B:-8

C. C: 1

D. D: -1

Answer: A

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48. If $\left(\sqrt{3}+i\right)^{100}=2^{99}(a+ib)$ then $a^2+b^2=$

A. a,2

B. b.4

C. c.8

D. d.16

Answer: B

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49. 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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50. If $z=\dfrac{\sqrt{3}+i}{2}$ then $z^{69}=$

A. -i

B. i

C. 1

D. -1

Answer: A

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51. $(1+i)^{6}+(1-i)^{6}=$

A. 0

B. 2^{7}

C. 2^{6}

D. 2^{5}

Answer: A

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52. One of the value of

$\left(\frac{\cos(\pi)}{6}+i\frac{\sin(\pi)}{6}\right)^{\frac{1}{2}}+\left(\frac{\cos(\pi)}{6}-i\frac{\sin(\pi)}{6}\right)^{\frac{1}{2}}$ is

A. 1

B. 0

C. -1

D. none of these

Answer: B

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53. One of the values of $\left(\left(\frac{\cos(\pi)}{6} - i\frac{\sin(\pi)}{6}\right)^{\frac{1}{2}}\right)\left(\left(\frac{\cos(\pi)}{6} + i\frac{\sin(\pi)}{6}\right)^{\frac{1}{2}}\right)$ is

A. 1

B. 0

C. -1

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

Answer: C

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54. If $\left(\frac{1+\cos\theta+i\sin\theta}{\sin\theta+i+i\cos\theta}\right)^4=\cos n\theta+i\sin n\theta$, then n=

A. A: 2

B. B: 3

C. C: 4

D. D: 1

Answer: C

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55. $\left(\frac{\cos\theta+i\sin\theta}{\sin\theta+i\cos\theta}\right)^4=$

A. $\cos 6\theta+i\sin 6\theta$

B. $\cos 8\theta-i\sin 8\theta$

C. $\cos 8\theta + i \sin 8\theta$

D. $\cos 6\theta - i \sin 6\theta$

Answer: C

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56. $\left(\frac{\sin\left(\frac{\pi}{8}\right) + i\cos\left(\frac{\pi}{8}\right)}{\sin\left(\frac{\pi}{8}\right) - i\cos\left(\frac{\pi}{8}\right)}\right)^8 =$

A. a.-1

B. b.0

C. c.1

D. d.2i

Answer: C

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57. $\left(\dfrac{1+\cos.\frac{\pi}{8}+i\sin.\frac{\pi}{8}}{1+\cos.\frac{\pi}{8}-i\sin.\frac{\pi}{8}}\right)^{8}=$

A. 1+i

B. 1-i

C. 1

D. -1

Answer: B

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58. The value of $\left(\dfrac{1+i\sqrt{3}}{1-i\sqrt{3}}\right)^{6}+\left(\dfrac{1-i\sqrt{3}}{1+i\sqrt{3}}\right)^{6}=$

A. 2

B. -2

C. 1

D. 0

Answer: A

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59. If $\theta = \frac{\pi}{6}$ then the 10^{th} term of the series $1 + (\cos\theta + i\sin\theta) +$ $(\cos\theta + i\sin\theta)^2 +$...... . is

A. -1

B. i

C. $\frac{1}{2} + i\frac{\sqrt{3}}{2}$

D. -i

Answer: B

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60. If $2\cos\theta = x + \frac{1}{x}$ and $2\cos\phi = y + \frac{1}{y}$ then the value of $\cos(\theta + \phi)$ will be

A. $\frac{x}{y}+\frac{y}{x}$

B. $2\left[\frac{x}{y}+\frac{y}{x}\right]$

C. $\frac{1}{2}\left[xy+\frac{1}{xy}\right]$

D. $xy+\frac{1}{xy}$

Answer: C

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61. The value of $\left(\sin\left(\frac{\pi}{3}\right)+i\cos\left(\frac{\pi}{3}\right)\right)^3$ is

A. a.1

B. b.-1

C. c.i

D. d.-i

Answer: C

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62. $(\sin\theta + i\cos\theta)^9$=

A. $\sin 9\theta + i\cos 9\theta$

B. $\sin 9\theta - i\cos 9\theta$

C. $\cos 9\theta + i\cos 9\theta$

D. none of these

Answer: A

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63. $(\sin\theta + i\cos\theta)^9$=

A. $4 \mid (n-1)$

B. $4 \mid n$

C. $4 \mid (n+1)$

D. none of these

Answer: A

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64. If n is an integer and $z = \cos\theta + i\sin\theta$, then $\frac{z^{2n}-1}{z^{2n}+1} =$

A. $i\tan n\theta$

B. $i\cos n\theta$

C. $\cos n\theta$

D. $i\sin n\theta$

Answer: A

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65. $(1+\cos\theta+i\sin\theta)^{10}+(1+\cos\theta-i\sin\theta)^{10} =$

A. 1)$2^{10}\cos^{10}\left(\frac{\theta}{2}\right).\cos 5\theta$

B. 2)$2^{11}\cos^{10}\left(\frac{\theta}{2}\right).\cos 5\theta$

C. 3)$2^{11}\frac{\cos^5(\theta)}{2}.\cos 10\theta$

D. 4)$2^{10}\frac{\cos^5(\theta)}{2}.\cos 10\theta$

Answer: B

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66. The value of $(a+ib)^{\frac{m}{n}}+(a-ib)^{\frac{m}{n}}$ is equal to

A. a.$(a^2+b^2)^{\frac{\pi}{2}}\cos\left(\frac{m}{n}\tan^{-1}\left(\frac{b}{a}\right)\right)$

B. b. $2(a^2+b^2)^{\frac{7}{2}}\cos\left(\frac{m}{n}\tan^{-1}\left(\frac{b}{a}\right)\right)$

C. c.$(a^2+b^2)^{\frac{7}{\alpha}}\cos\left(\frac{m}{n}\tan^{-1}\left(\frac{b}{a}\right)\right)$

D. d.$2(a^2+b^2)^{\frac{m}{2n}}\cos\left(\frac{m}{n}\tan^{-1}\left(\frac{b}{a}\right)\right)$

Answer: B

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67. $\left(\sqrt{3}+i\right)^{6}+\left(\sqrt{3}-i\right)^{6}=$

A. 2^6

B. 0

C. -1

D. 2^5

Answer: B

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68. $\left(1+i\sqrt{3}\right)^{5}+\left(1-i\sqrt{3}\right)^{5}=$

A. 2^5

B. 1

C. 2^6

D. 0

Answer: A

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69. If one of the values of $(\cos\theta + i\sin\theta)^{\frac{t}{3}} is \frac{\cos(\theta)}{3} + i\frac{\sin(\theta)}{3}$, the other two values are

A. $\cos\left(\pi + \frac{\theta}{3}\right), \cos\left(\pi - \frac{\theta}{3}\right)$

B. $\cos\left(\frac{2\pi}{3} + \frac{\theta}{3}\right), \cos\left(\frac{4\pi}{3} + \frac{\theta}{3}\right)$

C. $\cos\left(\frac{2\pi}{3} + \frac{\theta}{3}\right), \cos\left(\frac{4\pi}{3} - \frac{\theta}{3}\right)$

D. $\cos\left(\frac{2\pi}{3} - \frac{\theta}{3}\right), \cos\left(\frac{4\pi}{3} + \frac{\theta}{3}\right)$

Answer: B

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70. The product of the values of $\left(\cos\left(\frac{\pi}{3}\right)+i\sin\left(\frac{\pi}{3}\right)\right)^{\frac{3}{4}}$ is

A. 1

B. -1

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

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

Answer: A

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71. The continued product of the cube roots of $3+\sqrt{3}i$ is

A. 3

B. -3

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

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

Answer: C

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72. The continued product of the fourth roots of $-1 + i\sqrt{3}$ is

A. -1

B. $1 - i\sqrt{3}$

C. $-1 + i\sqrt{3}$

D. 1

Answer: B

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73. If one of the square roots of $\sqrt{3} - iis\sqrt{2}cis\left(-\frac{\pi}{12}\right)$ then the other one is

A. $\sqrt{2}cis\frac{\pi}{12}$

B. $\sqrt{2}cis\frac{\pi}{6}$

C. $\sqrt{2}cis\frac{11\pi}{12}$

D. none of these

Answer: C

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74. If one of the cube roots of i is $cis\frac{\pi}{6}$ the other two roots are

A. $cis\frac{\pi}{3}$ and $cis\frac{5\pi}{6}$

B. $cis\frac{5\pi}{6}$ and $cis\frac{2\pi}{3}$

C. $cis\frac{2\pi}{3}$ and $cis\frac{\pi}{3}$

D. $cis\frac{5\pi}{6}$ and $cis\frac{3\pi}{2}$

Answer: D

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75. $\sqrt{i}+\sqrt{(-i)}$ equals :

A. 0

B. $\sqrt{2}$

C. -i

D. i

Answer: B

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76. If the fourth roots of unity are z_1, z_2, z_3, z_4 then $z_1^2+z_2^2+z_3^2+z_4^2=$

A. 1

B. 0

C. i

D. none of these

Answer: B

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77. If α and β are non real cube roots of unity then $\alpha\beta + \alpha^5 + \beta^5 =$

A. 1

B. 0

C. -1

D. 3

Answer: B

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78. The value of $\left(\frac{-1+i\sqrt{3}}{2}\right)^{26} + \left(\frac{-1-i\sqrt{3}}{2}\right)^{26}$ is

A. a.-1

B. b.2

C. c.0

D. d.none of these

Answer: A

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79. $\left(\frac{-1+i\sqrt{3}}{2}\right)^{3n}+\left(\frac{-1-i\sqrt{3}}{2}\right)^{3n}=$

A. 0

B. 1

C. 2

D. 3

Answer: C

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80. If $i=\sqrt{-1}, \omega$ is a non real cube root of unity then $\frac{(1+i)^{2n}-(1-i)^{2n}}{(1+\omega-\omega^2)(1-\omega+\omega^2)}=$

A. 0 if n is even

B. 0 for all n in $\bar{z}$

C. 2^{n-1} for all n in z

D. none of these

Answer: A

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81. If ω is an imaginary cube root of unity than $\left(1+\omega-\omega^2\right)^7=$

A. a.128ω

B. b.-128ω

C. c.$128\omega^2$

D. d.$-128\omega^2$

Answer: D

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82. The value of $(i)^i$ is

A. $-\left(\frac{\pi}{2}\right)$

B. $e^{-\left(\frac{\pi}{2}\right)}$

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

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

Answer: D

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83. If $x_r = \cos.\frac{\pi}{2^r} + i\sin.\frac{\pi}{2^r}$, then $x_1x_2x_3.... \infty =$

A. $x_1 + x_2 + ... + x_n = 1$

B. $x_1 + x_2 + x_3 + ... = 0$

C. $x_1. x_2. x_3, ... x_n = 1$

D. $x_1. x_2. x_3.... \to \infty = -1$

Answer: D

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84. If $a = cis\alpha$, $b = cis\beta$, $c = cis\gamma$ and $\frac{a}{b} + \frac{b}{c} + \frac{c}{a} = 1$ then $\cos(\alpha - \beta) + \cos(\beta - \gamma) + \cos(\gamma - \alpha) =$

A. 0

B. 1

C. -1

D. 2

Answer: B

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85. If α is an imaginary root of the equation $z^n - 1 = 0$ then $1 + \alpha + \alpha^2 + \ldots\ldots + \alpha^{n-1} =$

A. -1

B. 1

C. 0

D. 2

Answer: C

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86. If $x_r = \cos.\frac{\pi}{2^r} + i \sin.\frac{\pi}{2^r}$, then $x_1 x_2 x_3 \ldots.\infty =$

A. -i

B. -1

C. i

D. 1

Answer: B

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87. $\tan\left[i\log\left(\frac{a-ib}{a+ib}\right)\right]=$

A. a. $\frac{2ab}{a^2-b^2}$

B. b. $\frac{a^2-b^2}{2ab}$

C. c. $\frac{a^2+b}{2(2ab)}$

D. d. $\frac{2ab}{a^2+b^2}$

Answer: B

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88. If $x^2+x+1=0$ then $\sum_{r=1}^{25}\left(x^r+\frac{1}{x^r}\right)^2=$

A. 25

B. 25ω

C. $25\omega^2$

D. 49

Answer: D

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89. The area of the triangle whose vertices are $i, \omega\omega^2$

A. a.0

B. b.$\frac{3\sqrt{3}}{2}$

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

D. d.$\frac{\sqrt{3}}{4}$

Answer: D

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90. The centre of the square A B C D is at the origin. The vertex A is z. The centroid of triangle B C D is at

A. a.-z

B. b.$-\frac{z}{2}$

C. c.$-\frac{z}{3}$

D. d.$\frac{z}{3}$

Answer: C

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91. The value of $\sum_{k=1}^{6}\left[\ \sin\frac{2K\pi}{7}-i\ \cos\frac{2K\pi}{7}\right]$ is

A. 0

B. 1

C. -1

D. i

Answer: D

Watch Video Solution

92. The locus of the point satisfying the condition amp. $\left(\frac{z-1}{z+1}\right)=\frac{\pi}{3}$ is

A. a line through the origin

B. a line not through the origin

C. a circle through the origin

D. a circle not through the origin

Answer: D

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93. If $z = \frac{\sqrt{3}}{2} - \frac{1}{2}i$, then $\left(i^{93} + z^{93}\right)^{99} =$

A. a.$2^{99}i$

B. b.$-2^{99}i$

C. c.2^{99}

D. d.-2^{99}

Answer: B

Watch Video Solution

94. If $\frac{z-1}{z+1}$ is purely imaginary, then $|z| =$

A. a.$\frac{1}{2}$

B. b.2

C. c.$\sqrt{2}$

D. d.1

Answer: D

Watch Video Solution

95. For any integer n, the argument of $\dfrac{\left(\sqrt{3}+i\right)^{4n+1}}{\left(1-i\sqrt{3}\right)^{4n}}$ is

A. a.$\dfrac{\pi}{6}$

B. b.$\dfrac{\pi}{3}$

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

D. d.$\dfrac{2\pi}{3}$

Answer: A

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96. If $x_r = \cos.\frac{\pi}{2^r} + i\sin.\frac{\pi}{2^r}$, then $x_1x_2x_3.... \infty =$

A. 1

B. -1

C. -2

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

Answer: B

Watch Video Solution

97. If $z_1 = 1 + i\sqrt{3}, z_2 = 1 - i\sqrt{3},$ then $\frac{z_1^{100} + z_2^{100}}{z_1 + z_2} =$

A. a.2^{100}

B. b.2^{-100}

C. c.-2^{100}

D. d.-2^{99}

Answer: D

Watch Video Solution

98. If $z_1 = 1 + i, z_2 = \sqrt{3} + i,$ then arg $\left(\frac{z_1}{z_2}\right)^{50} =$

A. a. $\frac{\pi}{6}$

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

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

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

Answer: A

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99. If 1,$a_1, a_2. \ldots, a_{n-1}$ are n roots of unity, then the value of $(1 - a_1)(1 - a_2)\ldots. (1 - a_{n-1})$ is :

A. n

B. 2^n

C. $2^n + 1$

D. $2^n - 1$

Answer: D

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100. If z is such that $|z - 2i| = 2\sqrt{2}$, then arg $\left(\frac{z-2}{z+2}\right) =$

A. a. $\frac{\pi}{6}$

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

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

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

Answer: B

Watch Video Solution

101. If $|z_1 - 1| < 2, |z_2 - 2| < 1$, then $|z_1 + z_2|$

A. ≥ 1

B. > 2

C. ≤ 2

D. < 6

Answer: D

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102. 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 equals :

A. 0

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

C. $\pm\frac{\pi}{2}$

D. π

Answer: D

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103. The number i^i is

A. a.real and positive

B. b.real and negative

C. c.pure imaginary

D. d.of amplitude $\frac{\pi}{2}$

Answer: A

Watch Video Solution

104. The complex number z has argument,$0 < \theta < (\pi)(2)$and satisfy the equation $|z - 3i| = 3$. Then $\cot\theta - \frac{6}{z} =$

A. 1

B. -1

C. i

D. -i

Answer: C

Watch Video Solution

105. 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 equals :

A. 0

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

C. $\pm\frac{\pi}{2}$

D. π

Answer: C

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106. The inequality $|z-4| < |z-2|$ represents the region given by

A. $Rez > 0$

B. $Rez < 0$

C. $Rez > 2$

D. $Rez > 3$

Answer: D

Watch Video Solution

107. The smallest positive integer n for which $(1+i\sqrt{3})^{\frac{n}{2}}$ is real is

A. 3

B. 0

C. 6

D. 12

Answer: C

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108. If $x^2+x+1=0$, then $\sum_{r=1}^{2005}\left(x^r+\frac{1}{x^r}\right)^3=$

A. 4007

B. 4006

C. 4005

D. 4000

Answer: A

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109. If z_1, z_2, z_3 be vertices of an equilateral triangle occurring in the anticlockwise sense then,

A. $z_1^2 + z_2^2 + z_3^2 = 2(z_1z_2 + z_2z_3 + z_3z_1)$

B. $\frac{1}{z_1 + z_2} + \frac{1}{z_2 + z_3} + \frac{1}{z_3 + z_1} = 0$

C. $z_1 + \omega z_2 + \omega^2 z_3 = 0$

D. none of these

Answer: C

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110. If z_1, z_2 are two complex numbers such that $Im(z_1 + z_2) = 0$and $Im(z_1z_2) = 0$, then

A. $z_1 = -z_2$

B. $z_1 = z_2$

C. $z_1 = -z_2$

D. $z_1 = \bar{z_2}$

Answer: C

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111. If α is an imaginary fifth root of unity then $\log_2\left|1+\alpha+\alpha^2+\alpha^3-\frac{1}{\alpha}\right| =$

A. 1

B. 0

C. 2

D. -1

Answer: A

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112. If $|z+\bar{z}|+|z-\bar{z}|=8$ then z lies on

A. 1.a circle

B. 2.a straight line

C. 3.a square

D. 4.an ellipse

Answer: C

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113. The equation $|z+i|-|z-i|=k$ represents a hyperbola, if

A. $k \in (-2, 2)$

B. $k \in [-2, 2]$

C. $k \in (0, 2)$

D. $k \in (-2, 0)$

Answer: A

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114. If $|z| = k$ and $w = \frac{z-k}{z+k}$, then $Re(w) =$

A. 0

B. k

C. $\frac{1}{k}$

D. $-\frac{1}{k}$

Answer: C

Watch Video Solution

115. If z is a complex number satisfying $z^4 + z^3 + 2z^2 + z + 1 = 0$ then $|z| =$

A. a. $\frac{1}{2}$

B. b. $\frac{3}{4}$

C. c.1

D. d.2

Answer: C

Watch Video Solution

116. If alpha is a non-real fifth root of unity, then $3^{\left|1+\alpha+a^2+a^{-2}-a^{-1}\right|}=$

A. 9

B. 1

C. $\frac{11}{3}$

D. $\frac{1}{9}$

Answer: A

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117. If α is a non-real fourth roots of unity, then the values of $\alpha^{4n-1}+\alpha^{4n-2}+\alpha^{4n-3}, n \in N$ is

A. 0

B. -1

C. 3

D. 4

Answer: B

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118. If $x^2-x+1=0$ then the value of $\sum_{n=1}^{5}\left(x^n+\frac{1}{x^n}\right)^2$ is

A. 8

B. 10

C. 12

D. 16

Answer: A

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119. If arg $(z) < \theta$, then arg $(-z) - arg(z) =$

A. π

B. $-\pi$

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

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

Answer: A

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120. If $\left(\sqrt{3}-i\right)^n = 2^n$, n in Z, then n is a multiple of

A. 6

B. 10

C. 9

D. 12

Answer: D

Watch Video Solution

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

A. 3

B. 4

C. 6

D. 8

Answer: C

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122. If w is a complex cube roots of unity, then $arg(iw) + arg(iw^2) =$

A. 0

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

C. π

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

Answer: C

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123. If $z(2-2\sqrt{3}i)^2 = i(\sqrt{3}+i)^4$ then $argz =$

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

B. $-\frac{\pi}{6}$

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

D. $\frac{7\pi}{6}$

Answer: B

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124. If $\left(\frac{3}{2} + \frac{i\sqrt{3}}{2}\right)^{28} = 3^{14}(x + iy)$ then $(x, y) =$ (where x and y are reals)

A. $\left(-\frac{1}{2}, -\frac{\sqrt{3}}{2}\right)$

B. $\left(-\frac{1}{2}, \frac{\sqrt{3}}{2}\right)$

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

D. $\left(\frac{1}{2}, -\frac{\sqrt{3}}{2}\right)$

Answer: B

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125. If $1, \alpha_1, \alpha_2, \ldots., \alpha_{n-1}$ are the n^{th} roots of unity and n is odd natural number, then$(1+\alpha_1)(1+\alpha_2)\ldots..(1+\alpha_{n-1}) =$

A. 1

B. -1

C. 0

D. none of these

Answer: A

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126. The argument of $\dfrac{1-i\sqrt{3}}{1+i\sqrt{3}} =$

A. $\dfrac{\pi}{3}$

B. $\dfrac{2\pi}{3}$

C. $\frac{7\pi}{6}$

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

Answer: D

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127. Let z_1 and z_2 be two complex numbers such that $|z_1 + z_2|^2 = |z_1|^2 + |z_2|^2$. Then,

A. $Re\left(\frac{z_1}{z_2}\right) = 0$

B. $Im\left(\frac{z_1}{z_2}\right) = 0$

C. $Re(z_1 z_2) = 0$

D. $Im(z_1 z_2) = 0$

Answer: A

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128. If z is purely imaginary then and $Im(z) > 0$, then $amp(z) =$

A. π

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

C. 0

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

Answer: B

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129. If n is an odd integer, then $(1+i)^{6n} + (1-i)^{6n}$ is equal to

A. 0

B. 2

C. -2

D. -1

Answer: A

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130. The amplitude of $\sin\frac{\pi}{5} + i\left(1 - \cos\frac{\pi}{5}\right)$ is

A. $(2\pi)(5)$

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

C. $\frac{\pi}{15}$

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

Answer: D

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131. Number of solutions of the equation $z^2 + |z|^2 = 0$ is

A. 1

B. 2

C. 3

D. infinitely many

Answer: D

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132. The equation $|z+1-i| = |z-1+i|$ represents a

A. Straight line

B. Circle

C. Parabola

D. Hyperbola

Answer: A

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133. The area of the triangle on the complex plane formed by the complex number $z, \; -iz$ and $z+iz$ is

A. $|z|^2$

B. $\left|\overrightarrow{z}\right|^2$

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

D. none of these

Answer: C

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134. If the complex number $z=x+iy$ satisfies the condition $|z+1|=1$, then z lies on

A. x -axis

B. circle with centre (1,0) and radius 1

C. circle with centre (-1,0) and radius 1

D. y -axis

Answer: C

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135. $1+i^2+i^4+i^6+\ldots.+i^{2n}=$

A. positive

B. negative

C. 0

D. cannot be evaluated

Answer: D

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136. If $f(z)=\frac{7-z}{1-z^2}$, where $z=1+2$ i, then $|f(z)|$ is

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

B. $|z|$

C. $2|z|$

D. none of these

Answer: A

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137. The value of arg (x) when $x < 0$ is

A. 0

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

C. π

D. none of these

Answer: C

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138. The real value of $\theta$for which the expression is

$\frac{1 + i\cos\theta}{1 - i\cos\theta}$ is a real number is

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

B. $n\pi + (-1)^n \frac{\pi}{4}$

C. $2n\pi \pm \frac{\pi}{2}$

D. none of these

Answer: C

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139. $|z_1 + z_2| = |z_1| + |z_2|$ is possible if

A. $z_2 = \overline{z_1}$

B. $z_2 = \frac{1}{z_1}$

C. $arg(z_1) = arg(z_2)$

D. $|z_1| = |z_2|$

Answer: C

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140. If z is a complex number then

A. $|z^2| > |z|^2$

B. $|z^2| = |z|^2$

C. $|z^2| < |z|^2$

D. $|z^2| \geq |z|^2$

Answer: B

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141. The complex number z, which satisfies the condition $\left|\frac{1+z}{1-z}\right| = 1$ lies on

A. circle $x^2 + y^2 = 1$

B. the x - axis

C. the y -axis

D. the line x+y=1

Answer: B

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142. If $a + ib = c + id$, then

A. $a^2 + c^2 = 0$

B. $b^2 + c^2 = 0$

C. $b^2 + d^2 = 0$

D. $a^2 + b^2 = c^2 + d^2$

Answer: D

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143. Let x, y in R then $x + iy$ is a non real complex number is

A. x=0

B. y=0

C. $x \neq 0$

D. $y \neq 0$

Answer: D

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144. Let P be a point represented by the complex number Z. Rotate OP (O is the origin) through $\pi/2$ in the anti clockwise direction, the new position of the complex number is represented by

A. 1+2 i

B. -1-2 i

C. 2+i

D. -1+2 i

Answer: B

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145. Which of the following is correct for any two complex numbers z_1 and z_2 ?

A. $|z_1z_2| = |z_1|.|z_2|$

B. $arg(z_1.z_2) = argz_1.argz_2$

C. $|z_1 + z_2| = |z_1| + |z_2|$

D. $|z_1 + z_2| \geq |z_1| - |z_2|$

Answer: A

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146. A real value of x satisfies the equation $\frac{3-4ix}{3+4ix}=\alpha-i\beta$ $(\alpha, \beta \in R)$, if $\alpha^2+\beta^2=$

A. 1

B. -1-2 i

C. 2

D. -2

Answer: A

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

A. $x=2n+1$

B. $x=4n$

C. $x = 2n$

D. $x = 4n + 1$

Answer: B

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148. The value of $(z+3)(\bar{z}+3)$ is equivalent to

A. $|z+3|^2$

B. $|z-3|$

C. $z^2 + 3$

D. none of these

Answer: A

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149. If $z = x + iy$ lies in the third quadrant then, $\frac{\bar{z}}{z}$ also lies in the third quadrant if

A. $x > y > 0$

B. $x < y < 0$

C. $y < x < 0$

D. $y > x > 0$

Answer: B

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150. The real value of alpha for which the expression $\frac{1 - i\sin\alpha}{1 + 2i\sin\alpha}$ is purely real is

A. $(n+1)\frac{\pi}{2}$

B. $(2n+1)\frac{\pi}{2}$

C. $n\pi$

D. none of these

Answer: C

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151. $\sin x + i\cos 2x$ and $\cos x - i\sin 2x$ are conjugate to each other for,

A. $x = n\pi$

B. $x = \left(n + \frac{1}{2}\right)\frac{\pi}{2}$

C. $x = 0$

D. no value of x

Answer: D

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152. $\left|\frac{1}{(2+i)^2} - \frac{1}{(2-i)^2}\right|$

A. $\frac{\sqrt{8}}{5}$

B. $\frac{8}{25}$

C. $\frac{25}{8}$

D. none of these

Answer: B

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153. $\left(\frac{1-i}{1+i}\right)^2 =$

A. 1

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

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

D. -1

Answer: D

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154. The simplified form of $i^n + i^{n+1} + i^{n+2} + i^{n+3}$ is

A. 1

B. i

C. i^n

D. 0

Answer: D

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155. If $\left(\frac{1+i}{1-i}\right)^m = 1$, then the least positive integral value of m is

A. 4

B. 5

C. 6

D. 7

Answer: A

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156. If ω is a cube roots of unity then $(1-\omega)(1-\omega^2)(1-\omega^4)(1-\omega^8) =$

A. 3

B. ω

C. 9

D. 1

Answer: C

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157. If $(1+i)(1+2i)(1+3i).....(1+ni) = x+iy$ then 2.5.10 ....

$(1+n^2) =$

A. $\frac{\sqrt{x}}{2}+\frac{\sqrt{y}}{2}$

B. $\frac{\sqrt{x}+\sqrt{y}}{\sqrt{x}-\sqrt{y}}$

C. x^2+y^2

D. x^2-y^2

Answer: C

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158. If $z=1+i$ then the multiplicative inverse of z^2 is

A. 2 i

B. 1-i

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

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

Answer: D

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159. If $x + iy = \sqrt{\frac{a+ib}{c+id}}$ then $\left(x^2+y^2\right)^2 =$

A. $\frac{c^2+d^2}{a^2+b^2}$

B. $\frac{a^2-b^2}{c^2+d^2}$

C. $\sqrt{\left(a^2+\frac{b^2}{c^2+d^2}\right)}$

D. $\frac{a^2+b^2}{c^2+d^2}$

Answer: D

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160. If $a = \cos\theta + i\sin\theta$ then $\frac{1+a}{1-a} =$

A. $i\frac{\cot(\theta)}{2}$

B. $i\dfrac{\tan(\theta)}{2}$

C. $\dfrac{\cot(\theta)}{2}$

D. $\cot\theta$

Answer: A

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161. The modulus and amplitude of $\dfrac{1+i}{1-i}$ are

A. $-1, \ -\dfrac{\pi}{2}$

B. $1, \dfrac{\pi}{2}$

C. $\sqrt{2}, \dfrac{\pi}{3}$

D. $1, \dfrac{\pi}{4}$

Answer: B

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162. If we express

$$\frac{(\cos 2\theta - i\sin 2\theta)^4(\cos 4\theta + i\sin 4\theta)^{-5}}{(\cos 3\theta + i\sin 3\theta)^{-2}(\cos 3\theta - i\sin 3\theta)^{-9}}$$ in the form of $x + iy$ we get

A. $\cos 49\theta + i\sin 49\theta$

B. $\cos 21\theta + i\sin 21\theta$

C. $\cos 23\theta + i\sin 23\theta$

D. $\cos 49\theta - i\sin 49\theta$

Answer: D

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163. In the argand diagram the points representing the complex numbers

$7 + 9i, 3 - 7i \text{ and } -3 + 3i$

A. Are collinear

B. Form the vertices of an equilateral triangle

C. Form the vertices of an isosceles triangle

D. Form the vertices of a angled isosceles triangle

Answer: D

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164. $1, \omega, \omega^2$ are cube roots of unit x, then their product is

A. 1

B. -1

C. ω

D. 0

Answer: A

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165. The conjugate of $\frac{(2+i)^2}{3+i}$ in the form of $a+ib$ is

A. $\frac{13}{10}+i\left(\frac{9}{10}\right)$

B. $\frac{13}{10}+i\left(\frac{-9}{10}\right)$

C. $\frac{13}{10}+i\left(\frac{-15}{2}\right)$

D. $\frac{13}{2}+i\left(\frac{15}{2}\right)$

Answer: B

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166. If $z(2-i)=3+I, z^{20}$=

A. -1024

B. 1-i

C. 1+i

D. 1024

Answer: A

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167. Let z_1 and z_2 be n^{th} roots of unity which subtend a right angle at the origin. Then n must be of the form.

A. 4 k+2

B. 4 k

C. 4 k+3

D. 4 k+1

Answer: A

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168. If $\omega = -\frac{1}{2} + i\frac{\sqrt{3}}{2}$, the value of $\begin{bmatrix} 1 & \omega & \omega^2 \\ \omega & \omega^2 & 1 \\ \omega^2 & 1 & \omega \end{bmatrix}$ is

A. 3

B. 0

C. 1

D. -1

Answer: B

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169. The amplitude of $\sin\frac{\pi}{5}+i\left(1-\cos\frac{\pi}{5}\right)$ is

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

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

C. $\frac{\pi}{15}$

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

Answer: D

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170. If $\sqrt{x}+\frac{1}{\sqrt{x}}=2\cos\theta$ then $x^{6}+x^{-6}=$

A. $2\cos 12\theta$

B. $2\cos 6\theta$

C. $2\sin 3\theta$

D. $2\cos 3\theta$

Answer: A

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171. Which of the following is a fourth root of

A. $\frac{1}{2}+i\frac{\sqrt{3}}{2}$

B. $cis\frac{\pi}{12}$

C. $cis\frac{\pi}{2}$

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

Answer: A

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172. If $\omega = \dfrac{-1 + i\sqrt{3}}{2}$ then $\left(3 + \omega + 3\omega^2\right)^4 =$

A. 16

B. -16

C. 16 ω

D. 16 ω^2

Answer: C

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173. If $x + \dfrac{1}{x} = 2\cos\alpha$ then $x^n + \dfrac{1}{x^n}$=

A. $2^n \cos\alpha$

B. $2^n \cos n\alpha$

C. $2i \sin n\alpha$

D. $2 \cos n\alpha$

Answer: D

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174. The smallest positive integer for which $(1+i)^{2n} = (1-l)^{2n}$ is

A. 1

B. 2

C. 3

D. 4

Answer: B

Watch Video Solution

175. The real part of $\dfrac{1}{1+\cos\theta+i\sin\theta}$ is

A. $\sqrt{2}$

B. $\dfrac{1}{\sqrt{2}}$

C. $-\dfrac{1}{2}$

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

Answer: D

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176. The modulus and amplitude of $\dfrac{1+2i}{1-(1-i)^2}$ are respectively

A. 1 and $\dfrac{\pi}{3}$

B. 1 and $\dfrac{\pi}{4}$

C. $\sqrt{2}$ and $\dfrac{\pi}{6}$

D. 1 and 0

Answer: D

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177. The complex number $\frac{\left(-\sqrt{3}+3i\right)(1-i)}{\left(3+\sqrt{3}i\right)(i)\left(\sqrt{3}+\sqrt{3}i\right)}$ when represented in the Argand diagram is

A. on the x -axis (real axis)

B. on the y -axis (imaginary axis)

C. in the first quadrant

D. in the second quadrant

Answer: B

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178. If $2x = -1 + \sqrt{3}i$, then the value of $\left(1 - x^2 + x\right)^6 - \left(1 - x + x^2\right)^6 =$

A. 0

B. 64

C. -64

D. 32

Answer: A

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179. The modulus of amplitude of $\left(1 + i\sqrt{3}\right)^8$ are respectively

A. 256 and $\frac{8\pi}{3}$

B. 2 and $\frac{2\pi}{3}$

C. 256 and $\frac{2\pi}{3}$

D. 256 and $\frac{\pi}{3}$

Answer: D

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180. The conjugate of $\frac{3-2i}{5+7i}$ is

A. $(1)\frac{1-3i}{74}$

B. $(1)\frac{31+i}{74}$

C. $(1)\frac{31-i}{74}$

D. $(1)\frac{1+31i}{74}$

Answer: D

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181. If $x^2-x+1=0$ then the value of $\sum_{n=1}^{5}\left(x^n+\frac{1}{x^n}\right)^2$ is

A. 10

B. 8

C. 6

D. 4

Answer: B

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182. The conjugate of the complex number $\frac{(1+i)^2}{1-i}$ is

A. 1-i

B. 1+i

C. -1-i

D. -1+i

Answer: C

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183. The real and imaginary part of $\log_e\left(1+\sqrt{3}i\right)$ are

A. $\log_e^2$ and $\frac{\pi}{3}$

B. $\log_e^{\sqrt{2}}$ and $\frac{\pi}{3}$

C. $\log_e^2$ and $\frac{\pi}{6}$

D. $\log_e^{\sqrt{2}}$ and `(pi)/(6)

Answer: A

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184. The amplitude of $\sin\frac{\pi}{5}+i\left(1-\cos\frac{\pi}{5}\right)$ is

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

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

C. $\frac{\pi}{15}$

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

Answer: D

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185. Let z and w be two non-zero complex numbers such that $|z| = |w|$ and arg.(z) + arg.$(w) = \pi$. Then z equals :

A. $\overline{\omega}$

B. $-\overline{\omega}$

C. ω

D. $-\omega$

Answer: B

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186. The locus of the centre of a circle which touches the circles $|z - z_1| = a$ and $|z - z_2| = b$ externally is

A. an ellipse

B. a hyperbola

C. circle

D. none

Answer: B

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187. Let z_1 and z_2 be two roots of the equation $z^2 + az + b = 0$, z being complex number, assume that the origin z_1 and z_2 form an equilateral triangle , then

A. $a^2 = b$

B. $a^2 = 2b$

C. $a^2 = 3b$

D. $a^2 = 4b$

Answer: C

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188. If z and w are two non-zero complex numbers such that $|zw| = 1$ and $arg(z) - arg(w) = \frac{\pi}{2}$, then $\bar{z}w$ is equal to

A. 1

B. -1

C. i

D. -i

Answer: D

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

A. 4 n

B. 2 n

C. $4n + 1$

D. $2n + 1$

Answer: A

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190. If $1, \omega, \omega^2$ are the cube roots of unity, then

$$\begin{bmatrix} 1 & \omega^n & \omega^{2n} \\ \omega^n & \omega^{2n} & 1 \\ \omega^{2n} & 1 & \omega^n \end{bmatrix}$$

A. 0

B. 1

C. ω

D. ω^2

Answer: A

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191. Let z, w be complex numbers such that $\bar{z} + i\overline{w} = 0$ 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

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192. If $z = x - iy$ and $z^{\frac{1}{3}} = p + iq$ then

$\left(\frac{x}{p} + \frac{y}{q}\right) \div (p^2 + q^2) =$

A. 1

B. -2

C. 2

D. -1

Answer: B

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193. If $\left|z^2 - 1\right| = |z|^2 + 1$, then z lies on :

A. the real axis

B. an ellipse

C. a circle

D. the imaginary axis

Answer: D

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

A. -1,-1,-1

B. $-1, \; -1+\omega, \; -1-2\omega^2$

C. $-1, 1+2\omega, 1+2\omega^2$

D. $-1, 1-2\omega, 1-2\omega^2$

Answer: D

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195. If $\omega = \dfrac{z}{z-(i)(3)}$ and $|\omega| = 1$, the z lies on

A. a circle

B. an ellipse

C. a parabola

D. a straight line

Answer: D

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196. If $w = \alpha + i\beta$, where $\beta \neq 0$ and $z \neq 1$, satisfies the condition that $\left(\frac{w - \overline{w}z}{1 - z}\right)$ is purely real, then the set of values of z is

A. $|z| = 1$

B. $z = \bar{z}$

C. $z = -\bar{z}$

D. $z = 0$

Answer: A

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

A. -1

B. -i

C. i

D. 1

Answer: B

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198. If $z^2+z+1=0$ then $\sum_{r=1}^{6}\left(z^r+\frac{1}{z^r}\right)^2=$

A. 6

B. 12

C. 18

D. 24

Answer: B

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

A. 10

B. 6

C. 0

D. 4

Answer: B

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200. The values of x and y which satisfy the equation

$$\frac{(1+i)x-2i}{3+i}+\frac{(2-3i)y+i}{3-i}=i$$ are

A. x=0, y=1

B. x=1, y=0

C. x=3, y=-1

D. x=-1, y=3

Answer: C

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201. The complex plane of $z = x + iy$, which satisfies the equation $\left|\frac{z - 5i}{z + 5i}\right| = 1$, lies on

A. the x -axis

B. line y=5

C. a circle through the origin

D. none of these

Answer: A

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202. If $z=\left(\frac{\sqrt{3}}{2}+\frac{i}{2}\right)^5+\left(\frac{\sqrt{3}}{2}-\frac{i}{2}\right)^5$, then:

A. Re z=0

B. Im z=0

C. $Rez>0, Imz<0$

D. $Rez>0, Imz>0$

Answer: B

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203. The points z_1, z_2, z_3, z_4 in complex plane are the vertices of a parallelogram, taken in order if :

A. $z_1+z_4=z_2+z_3$

B. $z_1+z_3=z_2+z_4$

C. $z_1 + z_2 = z_3 + z_4$

D. none of these

Answer: B

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204. If $z = x + iy$ and $w = \dfrac{1 - iz}{1 + iz}$, then $|w| = 1$ implies that, in the complex plane

A. z lies on the imaginary axis

B. z lies on the unit circle

C. z lies on the real axis

D. none of these

Answer: C

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205. If z_1, z_2, z_3 represent the vertices of an equilateral triangle such that $|z_1| = |z_2| = |z_3|$, then

A. $z_1 + z_2 = z_3$

B. $z_1 + z_2 + z_3 = 0$

C. $z_1 z_2 = \frac{1}{z_3}$

D. $z_1 - z_2 = z_3 - z_2$

Answer: B

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206. If z_1, z_2, z_3 are three complex numbers in A.P., then they lie on

A. circle

B. a straight line

C. a parabola

D. an ellipse

Answer: B

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207. 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 equals :

A. 0

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

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

D. π

Answer: A

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208. $\sin x + i \cos 2x$ and $\cos x - i \sin 2x$ are conjugate to each other for,

A. 0

B. $n\pi$

C. $\left(n-1, \frac{1}{2}\right)\pi$

D. does not exist

Answer: D

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209. If $1, \omega, \omega^2$ are the three cube roots of unity and α, β, γ are the cube roots of $p, p < 0$, then for any x, y, z the expression $\frac{x\alpha + y\beta + z\gamma}{x\beta + y\gamma + z\alpha} =$

A. 1

B. ω

C. ω^2

D. none of these

Answer: C

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210. The complex number $\frac{1+2i}{1-i}$ lies in

A. first quadrant

B. second quadrant

C. third quadrant

D. fourth quadrant

Answer: B

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211. If $z \neq 0$ and $Rez = 0$ then

A. Re $z^2 = 0$

B. Im $z^2 = 0$

C. Re z^2=Im z^2

D. none

Answer: B

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212. If $z \neq 0$ and arg $z = \frac{\pi}{4}$, then

A. Re $z^2 = 0$

B. Im $z^2 = 0$

C. Re z=Im z

D. none

Answer: A

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213. If $z_1 = 8 + 4i$, $z_2 = 6 + 4i$ and arg $\left(\frac{z - z_1}{z - z_2}\right) = \frac{\pi}{4}$ then z satisfies

A. 1)$|z-7-4i|=1$

B. 2)$|z-7-5i|=\sqrt{2}$

C. 3) $|z-4i|=8$

D. 4)$|z-7i|=\sqrt{18}$

Answer: B

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214. For positive integers n_1 and n_2 the value of the expression $(1+i)^{n_1}+\left(1+i^3\right)^{n_1}+\left(1+i^5\right)^{n_2}+\left(1+i^7\right)^{n_2}$ is a real number if and only if

A. $n_1=n_2+1$

B. $n_1=n_2-1$

C. $n_2=n_2$

D. $n_1>0, n_2>0$

Answer: D

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215. If $\begin{vmatrix} 6i & -3i & 1 \\ 4 & -3i & -1 \\ 20 & 3 & i \end{vmatrix} = x + iy$, then :

A. x=3, y=1

B. x=1, y=3

C. x=0, y=3

D. x=0, y=0

Answer: D

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

A. i

B. i-1

C. -i

D. 0

Answer: B

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217. If ω is an imaginary cube root of unity than $(1+\omega-\omega^2)^7=$

A. 128 ω

B. -128ω

C. $128\omega^2$

D. $-128\omega^2$

Answer: D

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218. $4+5\left(-\frac{1}{2}+\frac{i\sqrt{3}}{2}\right)^{334}+3\left(-\frac{1}{2}+\frac{i\sqrt{3}}{2}\right)^{365}=$

A. $1-(i\sqrt{3})$

B. $-1+i\sqrt{3}$

C. $i\sqrt{3}$

D. $-i\sqrt{3}$

Answer: C

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219. If z_1, z_2, z_3 are complex numbers such that : $|z_1|=|z_2|=|z_3|=\left|\frac{1}{z_1}+\frac{1}{z_2}+\frac{1}{z_3}\right|=1$, then $|z_1+z_2+z_3|$ is equal to

A. 1

B. lt 1

C. gt 3

D. 3

Answer: A

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220. Let z_1 and z_2 be n^{th} roots of unity which subtend a right angle at the origin. Then n must be of the form.

A. 4 k+1

B. 4 k+2

C. 4 k+3

D. 4 k

Answer: D

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221. Let $\omega = -\frac{1}{2} + i\frac{\sqrt{3}}{2}$, then the value of

$$\begin{vmatrix} 1 & 1 & 1 \\ 1 & -1-\omega^2 & \omega^2 \\ 1 & \omega^2 & \omega^4 \end{vmatrix}$$ is

A. 3ω

B. $3\omega(\omega - 1)$

C. $3\omega^2$

D. $3\omega(1 - \omega)$

Answer: B

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222. The complex numbers z_1, z_2, z_3 satisfying $\frac{z_1 - z_3}{z_2 - z_3} = \frac{1 - i\sqrt{3}}{2}$ are the vertices of a triangle which is

A. of area zero

B. angled isosceles

C. equilateral

D. obtuse angled isosceles

Answer: C

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223. For all complex numbers z_1, z_2 satisfying $|z_1| = 12$ and $|z_2 - 3 - 4i| = 5$, the minimum value of $|z_1 - z_2|$ is

A. 0

B. 2

C. 7

D. 17

Answer: B

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224. If z is a complex number such that $|z| = 1, z \neq 1$, then the real part of $\left|\frac{z-1}{z+1}\right|$ is

A. 1) $\frac{1}{|z+1|^2}$

B. 2) $\frac{-1}{|z+1|^2}$

C. 3) $\frac{\sqrt{2}}{|z+1|^2}$

D. 4)0

Answer: D

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225. If ωbe a cube root of unity and $(1+\omega^2)^n = (1+\omega^4)^n$, then the least positive value of n is

A. 2

B. 3

C. 5

D. 6

Answer: B

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226. If $|z| = 1$ and $z \neq \pm 1$, then all the values of $\frac{z}{1 - z^2}$ lie on

A. a line not passing through the origin

B. $|z| = \sqrt{2}$

C. the x -axis

D. the y -axis

Answer: D

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227. The value of $\left(\frac{1+i\sqrt{3}}{1-i\sqrt{3}}\right)^6+\left(\frac{1-i\sqrt{3}}{1+i\sqrt{3}}\right)^6=$

A. 2

B. -2

C. 1

D. 0

Answer: A

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228. If $\alpha+i\beta=\tan^{-1}z, z=x+iy$ and α is constant, then locus of z is:

A. $x^2+y^2+2x\cot 2\alpha=1$

B. $\cot 2\alpha\left(x^2+y^2\right)=1+x$

C. $x^2+y^2+2y\tan 2\alpha=1$

D. $x^2+y^2+2x\sin 2\alpha=1$

Answer: A

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229. The value of $(i)^i$ is

A. ω

B. ω^2

C. $e^{-\frac{\pi}{2}}$

D. $2\sqrt{2}$

Answer: C

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230. In the Argand diagram all the complex numbers z satisfying $|z-4i|+|z+4i|=10$ lie on a

A. line

B. circle

C. ellipse

D. parabola

Answer: C

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231. The equation $|z+1-i|=|z-1+i|$ represents a

A. a line

B. a circle

C. a parabola

D. a hyperbola

Answer: A

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232. If z is any complex number satisfying $|z-1|=1$, then which of the following correct?

A. arg $(z-1)=2$ arg z

B. 2 arg $(z)=\frac{2}{3}$ arg (z^2-z)

C. arg $(z-1)$=arg $(z+1)$

D. arg z=2 arg (z+1)

Answer: A

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233. If the amplitude of $z-2-3i$is $\frac{\pi}{4}$, then the locus of $z=x+iy$ is

A. x+y-1=0

B. x-y-1=0

C. x+y+1=0

D. x-y+1=0

Answer: D

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234. If ω is a non real cube root of unity then $(a+b)(a+b\omega)\left(a+b\omega^2\right)$ is

A. a^2-b^2

B. a^3+b^3

C. a^3-b^3

D. a^2+b^2

Answer: A

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235. If $\sqrt{a+ib}=x+iy$, then a possible value of $\sqrt{a-ib}$ is

A. x^2+y^2

B. $\sqrt{x^2+y^2}$

C. $x+iy$

D. $x-iy$

Answer: D

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236. If $i^2=-1$ then $i+i^2+i^3+\ldots\ldots\ldots$ upto 1000 terms is equal to

A. 1

B. -1

C. i

D. 0

Answer: D

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237. If ω is a complex cube root of unity then the value of $\dfrac{p+\ +q\omega+r\omega^2}{r+p\omega+q\omega^2}+\dfrac{p+q\omega+r\omega^2}{q+r\omega+p\omega^2}=$ (where p, q, r are real)

A. 1

B. ω

C. ω^2

D. 0

Answer: D

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238. If α, β and γ are angles such that $\tan\alpha + \tan\beta + \tan\gamma = \tan\alpha . \tan\beta . \tan\gamma$and $x = \cos\alpha + i\sin\alpha, y = \cos\beta + i\sin\beta$ and $z = \cos\gamma + i\sin\gamma$, then x y z=

A. 1 but not -1

B. -1 but not 1

C. 1 or -1

D. 0

Answer: C

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239. The polar form of the complex number $\left(i^{25}\right)^3$ is

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

B. $\cos\pi + i\sin\pi$

C. $\cos\pi - i\sin\pi$

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

Answer: D

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240. For what value of x and y, the complex numbers. $9y^2 - 4 - 10xi$ and $8y^2 + 20i^7$ are conjugate to each other

A. $x = -2, y = 2$

B. $x = -2, y = -1$

C. $x = 2, y = 2$

D. $x = 2, y = -2$

Answer: A

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241. The point represented by the complex number $2 - i$ is rotated about origin through an angle of $\frac{\pi}{2}$ in clockwise direction. The new position of the point is

A. $1 + 2i$

B. $-1 - 2i$

C. $2 + i$

D. $-1 + 2i$

Answer: B

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242. The locus of the point z satisfying $arg\left(\frac{z-1}{z+1}\right) = k$, (where k is non zero) is

A. circle with centre on y -axis

B. circle with centre on x -axis

C. a straight line parallel to x -axis

D. a straight line making an angle 60° with the x -axis

Answer: A

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243. Let ω is an imaginary cube root of unity then the value of

$2(1+\omega)(1+\omega^2)+3(2\omega+1)(2\omega^2+1)+\ldots+(n+1)(n\omega+1)(n\omega^2+1)$

is

A. $\left[\frac{n(n+1)^2}{2}\right]+n$

B. $\frac{n^2(n+1)^2}{4}$

C. $\left[\frac{n(n+1)}{4}\right]^2-n$

D. none of these

Answer: A

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244. If $z = \dfrac{-2}{1+\sqrt{3}i}$, then the value of arg z is

A. π

B. $\dfrac{\pi}{3}$

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

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

Answer: C

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245. If z_1, z_2, z_3 be vertices of an equilateral triangle occurring in the anticlockwise sense then,

A. $1 + i\sqrt{3}$

B. $1 - i\sqrt{3}$

C. 1

D. -1

Answer: D

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246. If n is a positive integer, then $(1+i)^n + (1-i)^n =$

A. $(\sqrt{2})^{n-2}.\cos\left(\frac{n\pi}{4}\right)$

B. $(\sqrt{2})^{n-2}.\sin\left(\frac{n\pi}{4}\right)$

C. $(\sqrt{2})^{n+2}.\cos\left(\frac{n\pi}{4}\right)$

D. $(\sqrt{2})^{n+2}.\sin\left(\frac{n\pi}{4}\right)$

Answer: C

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247. If ω is a complex cube root of unity then the value of $\frac{p+\ +q\omega+r\omega^2}{r+p\omega+q\omega^2}+\frac{p+q\omega+r\omega^2}{q+r\omega+p\omega^2}=$ (where p, q, r are real)

A. 0

B. 1

C. -1

D. 2

Answer: C

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248. If z is a complex number in the argand plane, then the equation $|z-2|+|z+2|=8$ represents

A. 1)Paraabola

B. 2)elipse

C. 3)hyperbola

D. 4)circle

Answer: B

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249. Cube roots of unity are in

A. A.P.

B. G.P.

C. H.P

D. A.G.P

Answer: A

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250. If $x = a + b$, $y = a\omega + b\omega^2$, $z = a\omega^2 + b\omega$, then $xyz =$

A. $(a+b)^3$

B. a^3+b^3

C. a^3-b^3

D. $(a+b)^3-3ab(a+b)$

Answer: B

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251. The argument of $\frac{1-i\sqrt{3}}{1+i\sqrt{3}} =$

A. 60°

B. 120°

C. 24°

D. 300°

Answer: C

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252. If ω is the cube root of unity of the equation $z^3 = 1$, then the value of : $\frac{1}{2} + \frac{3}{8} + \frac{9}{32} + \frac{27}{128} + \dots\dots$ to $\infty \frac{\omega}{2} + \omega^2$ is

A. -1

B. 1

C. -i

D. i

Answer: A

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253. The reciprocal of $3 + i\sqrt{7}$ is

A. $\frac{3}{16} - \frac{\sqrt{7}}{16}i$

B. $\frac{3}{4} - \frac{\sqrt{7}}{4}i$

C. $\sqrt{7} + 3i$

D. $3 - \sqrt{7}i$

Answer: A

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254. If $(\cos\theta + i\sin\theta).(\cos 2\theta + i\sin 2\theta)......(\cos m\theta + i\sin m\theta) = 1$ then the value of theta is

A. a) $4m\pi$

B. b) $\dfrac{2m\pi}{m(m+1)}$

C. c) $\dfrac{4n\pi}{m(m+1)}$

D. d) $\dfrac{m\pi}{m(m+1)}$

Answer: C

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255. If $\left(\frac{1+i\sqrt{3}}{1-i\sqrt{3}}\right)^{n}$ is an integer, then `n=

A. 1

B. 2

C. 3

D. 4

Answer: C

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256. The value of $\left(1+\omega^{2}+2\omega\right)^{3n}-\left(1+\omega+2\omega^{2}\right)^{3n}=$

A. zero

B. 1

C. ω

D. ω^{2}

Answer: A

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257. The real value of $\theta$for which the expression is

$\frac{1 + i\cos\theta}{1 - i\cos\theta}$ is a real number is

A. $2n\pi + \pi$

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

C. $(2n - 1)\pi$

D. none of these

Answer: B

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258. Let $z = x + iy$ then $z. \bar{z} = 0$ if and only if

A. Re (z)=0

B. Im (z)=0

C. z = 0

D. none of these

Answer: C

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259. $\frac{3+2i\sin\theta}{1-2i\sin\theta}$ will be purely imaginary, if θ is equal to

A. pi/4

B. (pi)/(3)`

C. (pi)/(2)`

D. none of these

Answer: C

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

A. -1,-1,-1

B. $-1, \ -\omega, \ -\omega^2$

C. $-1, 2+3\omega, 2+\omega^2$

D. $-1, 2-3\omega, 2-\omega^2$

Answer: D

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261. If z is a complex number such that $z = -\bar{z}$ then

A. 1)z is a purely imaginary

B. 2)z is a purely real

C. 3)Real part of z is the same as its imaginary part

D. 4)z is any complex number

Answer: A

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262. The complex number $\frac{1+2i}{1-i}$ lies in

A. fourth quadrant

B. first quadrant

C. second quadrant

D. third quadrant

Answer: C

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263. If P is the point in the Argand diagrma correspoinding to the complex number $\sqrt{3}+i$ and if OPQ is an isosceles right angled triangle, right angled at O, then Q represents the complex number

A. $\sqrt{3}-i \text{ or } 1-i\sqrt{3}$

B. $-1 \pm i\sqrt{3}$

C. $-1+i\sqrt{3} \text{ or } 1=i\sqrt{3}$

D. $1 \pm i\sqrt{3}$

Answer: C

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264. The smallest positive integral value of ' n ' such that $\left[\left(1+\frac{\sin(\pi)}{8}+i\frac{\cos(\pi)}{8}\right)\left(1+\frac{\sin(\pi)}{8}-i\frac{\cos(\pi)}{8}\right)\right]^{n}$ is purely imaginary is

A. 2

B. 8

C. 4

D. 3

Answer: C

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265. The least positive integer n, for which $\frac{(1+i)^n}{(1-i)^{n-2}}$ is positive is

A. 2

B. 1

C. 4

D. 3

Answer: B

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266. If $x+iy=\left(-1+i\sqrt{3}\right)^{2010}$, then x=

A. -1

B. 1

C. 2^{2010}

D. -2^{2010}

Answer: C

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267. The value of $\left|\frac{1+i\sqrt{3}}{\left(1+\frac{1}{i+1}\right)^{2}}\right|=$

A. 20

B. 9

C. $\frac{5}{4}$

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

Answer: D

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268. If ω is an imaginary cube root of unity ,then the value of $(1-\omega+\omega^2).\,(1-\omega^2+\omega^4).\,(1-\omega^4+\omega^8)$.............(2n factors) is

A. 2^{2n}

B. 2^n

C. 1

D. 0

Answer: A

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269. If P(x, y) denotes $z=x+iy$ in Argand's plane and $\left|\frac{z-1}{z+2i}\right|=1$, then the locus of P is/an

A. hyperbola

B. ellipse

C. circle

D. straight line

Answer: D

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270. The argument of the complex number $\sin\left(\frac{6\pi}{5}\right) + i\left(1 + \cos.\ \frac{6\pi}{5}\right)$ is

A. $\frac{\pi}{10}$

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

C. $-\frac{\pi}{10}$

D. $\frac{25}{\pi}$

Answer: C

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271. The maximum value of $n < 101$ such that $1 + \sum_{k=1}^{n} i^k = 0$ is

A. 96

B. 97

C. 99

D. 100

Answer: C

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272. The value of $\left(-1+\sqrt{3}\right)^{62} + \left(-1-\sqrt{-3}\right)^{62}$ is

A. 2^{62}

B. 2^{64}

C. -2^{62}

D. 0

Answer: C

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273. All complex number z which satisfy the equation $\left|\frac{z-6i}{z+6i}\right| = 1$ lie on the

A. imaginary axis

B. real axis

C. neither of the axes

D. none of these

Answer: B

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274. If z is a complex number with $|z| = 1$ and $z + \frac{1}{z} = x + iy$, then $xy =$

A. 0

B. 1

C. 2

D. cannot be obtained

Answer: A

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275. The real part of log log i is

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

B. $\frac{\log(\pi)}{2}$

C. 0

D. none of these

Answer: B

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276. $\left(\frac{-1+i\sqrt{3}}{2}\right)^{50}+\left(\frac{-1-i\sqrt{3}}{2}\right)^{50}=$

A. 0

B. 1

C. 2

D. -1

Answer: D

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277. Among the complex numbers, z satisfying $|z+1-i|\leq 1,$ the number having the least positive argument is :

A. $1 - i$

B. $-1 + i$

C. i

D. -i

Answer: C

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

A. 5

B. 4

C. 6

D. none of these

Answer: C

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279. If $z_1 = \sqrt{3} - i$, $z_2 = 1 + i\sqrt{3}$, then amp$(z_1 + z_2) =$

A. $\frac{\pi}{12}$

B. $\frac{\pi}{15}$

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

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

Answer: A

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280. If $x_r = \cos. \frac{\pi}{2^r} + i \sin. \frac{\pi}{2^r}$, then $x_1 x_2 x_3 .... \infty =$

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

B. -1

C. 0

D. 1

Answer: B

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281. The product of the values of $\left(\cos\left(\frac{\pi}{3}\right)+i\sin\left(\frac{\pi}{3}\right)\right)^{\frac{3}{4}}$ is

A. 1

B. -1

C. 2

D. -2

Answer: A

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282. The inequality $|z-4| < |z-2|$ represents the region given by

A. $Re(z) > 0$

B. $Re(z) < 0$

C. $Re(z) > 2$

D. $Re(z) > 3$

Answer: D

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283. If $z = x + iy$ is a variable complex number such that arg $\left(\frac{z-1}{z+1}\right) = \left(\frac{\pi}{4}\right)$, then

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

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

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

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

Answer: C

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

A. 6

B. 0

C. 4

D. 10

Answer: A

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285. 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: A

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

A. 1)$\sqrt{5}$

B. 2)$\sqrt{5}+1$

C. 3)$\sqrt{5}-1$

D. 4)none of these

Answer: B

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

A. 1

B. 2

C. -2

D. -1

Answer: A

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

A. 2

B. ∞

C. 0

D. 1

Answer: D

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

A. 0,1

B. 1,1

C. 1,0

D. -1,1

Answer: B

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290. If $|z| = 1$ and $z \neq \pm 1$, then all the values of $\frac{z}{1 - z^2}$ lie on

A. a line not passing through origin

B. $|z| = \sqrt{2}$

C. the x -axis

D. the y -axis

Answer: D

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291. Points z in the complex plane satisfying $Re(z + 1)^2 = |z|^2 + 1$ lies on

A. 1) a circle

B. 2) a parabola

C. 3) an ellipse

D. 4)a hyperbola

Answer: B

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292. Let ω be the complex number $\frac{\cos(2\pi)}{3}+i\frac{\sin(2\pi)}{3}$. Then the number of distinct complex number z satisfying

$\begin{bmatrix} z+1 & \omega & \omega^2 \\ \omega & z+\omega^2 & 1 \\ \omega^2 & 1 & z+\omega \end{bmatrix} = 0$ is equal to

A. 1

B. 0

C. 2

D. 3

Answer: A

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293. If $|w|=1$, then the set of points $z=w+\frac{1}{w}$ is contained in or equal to the set of points z satisfying

A. $|Re)(z)| \ \leq 2 \text{ and } Im)(z)=0$

B. $|Re)(z)| \ \leq 1 \text{ and } Im)(z)=0$

C. $|Re)(z)| \ \leq 2 \text{ and } Im)(z)=0$

D. $|Re)(z)| \ < 1 \text{ and } Im)(z)=0$

Answer: C

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294. $i^2+i^4+i^6+\ldots..(2n+1)$ terms =

A. -1

B. 1

C. -i

D. i

Answer: A

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295. The value of $\sum_{k=1}^{6}\left(\sin\frac{2\pi k}{7}-I\cos\frac{2\pi k}{7}\right)$ is

A. -1

B. 0

C. -i

D. i

Answer: D

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296. If the imaginary part of $\frac{2z+1}{iz+1}$ is -2, then the locus of the point representing z in the complex plane is

A. circle

B. a parabola

C. a straight line

D. none of these

Answer: A

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297. If $|z| < \sqrt{2} - 1$, then $\left|z^2 + 2z\cos\alpha\right|$ is less than

A. 1

B. $\sqrt{2} + 1$

C. $\sqrt{2} - 1$

D. none of these

Answer: A

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298. The area of the triangle on the complex plane formed by the complex number $z, \; -iz$ and $z + iz$ is

A. $|z|^2$

B. $\frac{1}{2}|z|^2$

C. $\frac{1}{4}|z|^2$

D. $\frac{\sqrt{3}}{4}|z|^2$

Answer: B

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299. If $z = x + iy, \; z^{\frac{1}{3}} = a - ib$ and $\frac{x}{a} - \frac{y}{b} = k(a^2 - b^2)$ then the value of k=

A. 2

B. 4

C. 6

D. 1

Answer: B

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300. The complex plane of $z = x + iy$, which satisfies the equation $\left|\frac{z-5i}{z+5i}\right| = 1$, lies on

A. the axis of x

B. the line y=5

C. the circle passing through the origin

D. none of these

Answer: A

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301. If $Im\left(\frac{z-1}{2z+1}\right) = -4$ then the locus of z is

A. an ellipse

B. a parabola

C. a line

D. a circle

Answer: D

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302. If 1,$a_1, a_2. \ldots, a_{n-1}$ are n roots of unity, then the value of $(1-a_1)(1-a_2)\ldots.(1-a_{n-1})$ is :

A. $\sqrt{3}$

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

C. n

D. 0

Answer: C

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303. If $\left|\frac{z+i}{z-i}\right| = \sqrt{3}$, then the radius of the circle is

A. $\frac{2}{\sqrt{21}}$

B. $\frac{1}{\sqrt{21}}$

C. $\sqrt{3}$

D. $\sqrt{21}$

Answer: C

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304. If $\sqrt{3}+i = (a+ib)(c+id)$ then $\tan^{-1}\left(\frac{b}{a}\right) + \tan^{-1}\left(\frac{d}{c}\right) =$

A. $\frac{\pi}{3} + 2n\pi, n \in Z$

B. $n\pi + \frac{\pi}{6}, n \in Z$

C. $n\pi - \frac{\pi}{3}, n \in Z$

D. $2n\pi - \frac{\pi}{3}, n \in Z$

Answer: B

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305. Find the numbers of non-zero integral solutions of the equation $|1 - i|^x = 2^x$

A. 1

B. 2

C. infinite

D. none of these

Answer: D

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306. The region of the complex plane for which $\left|\frac{z-a}{z+a}\right| = 1, (Re) \neq 0$, is

A. x -axis

B. y -axis

C. the line x=a

D. none of these

Answer: B

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