doubtnut
India's Number 1 Education App

MATHS

BOOKS - DEEPTI MATHS (TELUGU ENGLISH)

COMPLEX NUMBERS

Solved Examples

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

A. 0

B. ± 1

C. ± 3

D. ± 4

Answer: B

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

A. $\sqrt{3}-1$

B. $\sqrt{3}$

C. $\sqrt{3}+1$

D. $\sqrt{3}+2$

Answer: C

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3. If ω a complex cube root of unity ,then

$$(2-\omega)\left(2-\omega^2\right)+2(3-\omega)\left(2-\omega^2\right)+\ldots\ldots.+(n-1)(n-\omega)\left(2-\omega^2\right)$$

A. $\dfrac{n(n-1)}{4}$

B. $\dfrac{n(n+1)}{4}$

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

D. $\frac{n(n+1)(n^+3n+4)}{4}$

Answer: D

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4. If a complex number z satisfies the relation $z^2 + z^{-2} = 2$, then the locus of z is

A. a straight line

B. a circle

C. a parabola

D. a hyperbola

Answer: D

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5. If $z = 1 + i\sqrt{3}$ then match the following

$$\begin{array}{lll} I & Arg(z) & \text{a)}5\pi/6 \\ II. & Arg(iz) & \text{b)}-\pi/3 \\ III. & Arg(\bar{z}) & \text{c)}\pi \\ IV. & Arg(i\bar{z}) & \text{d)}\pi/6 \\ & & \text{e)}\pi/3 \end{array}$$

A. $A \to 4, B \to 1, C \to 2, D \to 3$

B. $A \to 4, B \to 2, C \to 1, D \to 3$

C. $A \to 3, B \to 2, C \to 1, D \to 4$

D. $A \to 4, B \to 1, C \to 2, D \to 3$

Answer: D

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6. Let z_1, z_2 be the roots of the equation $z^2 + pz + q = 0, p, q$ are complex numbers. Suppose A and B represent z_1 and z_2 in the complex plane . If $\angle AOB = \alpha(\neq 0)$ and $OA = OB$ (where O is the origin) then $p^2 =$

A. $4q\cos\left(\frac{\alpha}{2}\right)$

B. $4q\cos^2(\alpha/2)$

C. $4q^2\cos\left(\frac{\alpha}{2}\right)$

D. $2q^2\cos^2\left(\frac{\alpha}{2}\right)$

Answer: B

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7. If z is a complex number, then the locus of z such that :

List I	List II
$(A)\|z\| = 1$	(1) Is a straight line
$(B)\|z+2i\| + \|z-2i\| = 4$	(2) Is a ellipse
$(C) Re(z^2) = 4$	(3) Is a hyperbola
$(D) z\bar{z} = 4$	(4)IS a pair of st. lines
	(5) Is a circle

The correct match is

A. $A \to 2, B \to 3, C \to 1, D \to 4$

B. $A \to 5, B \to -3, C \to 1, D \to 4$

C. $A \to 5, B \to 1, C \to 3, D \to 5$

D. $A \to 1, B \to 2, C \to 3, D \to 4$

Answer: C

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8. Match the items in column I with those in column II. Here $\omega \in 1$ is a cube root of unity .

Column I	C
(A) The value of $\frac{1}{3}(1-\omega)(1-\omega^2)(1-\omega^4)(1-\omega^8)$ is	(p
$(B)\omega(1+\omega-\omega^2)^7 =$	(q
(C) The least positive integer n such that $(1+\omega^2)^n = (1+\omega^4)^n$ is	(r
$(D)\frac{1}{1+2\omega}+\frac{1}{2+\omega}-\frac{1}{1+\omega}$ is equal to	(t

Now match for Column I from Column II

A. $\begin{matrix} (A) & (B) & (C) & (D) \\ q & s & t & p \end{matrix}$

B. $\begin{matrix} (A) & (B) & (C) & (D) \\ p & r & s & t \end{matrix}$

C. $\begin{matrix} (A) & (B) & (C) & (D) \\ t & p & t & s \end{matrix}$

D. $\begin{matrix} (A) & (B) & (C) & (D) \\ r & t & s & q \end{matrix}$

Answer: C

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Exercise 1

1. The additive inverse of $(1 + 2i)(3 - 4i)$ is

A. $11 + 2i$

B. $11 - 2i$

C. $-11 + 2i$

D. $-11 - 2i$

Answer:

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2. The additive inverse of $\dfrac{1 + 2i}{1 + i}$ is

A. $-\frac{3}{2}-\frac{i}{2}$

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

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

D. $-\frac{3}{2}+\frac{i}{2}$

Answer: A

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3. $\sqrt{-a}.\sqrt{-b}$ =

A. $\sqrt{ab}$

B. $\sqrt{-ab}$

C. $-\sqrt{ab}$

D. $\sqrt{abi}$

Answer: C

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4. $i^{243} =$

A. $-i$

B. i

C. 2i

D. i^2

Answer: A

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5. Simplifiy

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

A. i

B. $-i$

C. 1

D. -1

Answer: D

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

A. positive

B. negative

C. 0

D. cannot be determined

Answer: D

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7. The value of $\sum_{n=1}^{13} \left(i^n + i^{n+1}\right), \quad \text{where} \quad i = \sqrt{-1}$ is

A. i

B. $i - 1$

C. $-i$

D. 0

Answer: B

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8. $(1 - i)(1 + 2i)(1 - 3i) =$

A. $1 - 6i$

B. $8 - 6i$

C. $6 - 8i$

D. $6 + 8i$

Answer: C

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9. The multiplicative inverse of (3,4) is

A. $\left(\frac{3}{25}, \frac{4}{25}\right)$

B. $\left(\frac{3}{25}, -\frac{4}{25}\right)$

C. $\left(-\frac{3}{25}, -\frac{4}{25}\right)$

D. $\left(-\frac{3}{25}, \frac{4}{25}\right)$

Answer: B

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10. The multiplicative inverse of $(4+3i)$ is

A. $\frac{4}{25}+\frac{3}{25}i$

B. $\frac{4}{25}-\frac{3}{25}i$

C. $-\frac{4}{25}+\frac{3}{25}i$

D. $-\frac{4}{25}-\frac{3}{25}i$

Answer: B

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11. The multiplicative inverse of $(3+4i)i/25$ is

A. $4+3i$

B. $4-3i$

C. $-4-3i$

D. $-4+3i$

Answer: C

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12. Express $(2-3i)^3$ in the form of a + ib

A. 46 + 27i

B. $46 - 27i$

C. $-46 + 27i$

D. $-46 - 9i$

Answer: D

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13. Express $\frac{1}{4 - 5i}$ in the form of a + ib

A. $\frac{4}{41} + \frac{5}{41}i$

B. $\frac{3}{41} + \frac{4}{41}i$

C. $\frac{2}{41} + \frac{3}{41}i$

D. none

Answer: A

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14. Express $\frac{2-3i}{1+i}$ in the form of $a+ib$

A. $\frac{1}{2}-\frac{5}{2}i$

B. $-\frac{1}{2}-\frac{5}{2}i$

C. $-\frac{1}{2}+\frac{5}{2}i$

D. $\frac{1}{2}+\frac{5}{2}i$

Answer: B

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15. Express $\frac{3-2i}{5+4i}+\frac{3+2i}{5-4i}$ in the form of a + ib

A. $\frac{14}{41}+i.0$

B. $15+i.0$

C. $14-i.0$

D. $15 - i.0$

Answer: A

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16. Express $\left(\frac{a+ib}{a-ib}\right)+\left(\frac{a-ib}{a+ib}\right)$ in the form of $a+ib$

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

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

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

D. $\frac{2(a^2-b^2)}{a^2+b^2}$

Answer: D

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17. $\left(\frac{2+3i}{2-3i}\right)-\left(\frac{2-3i}{2+3i}\right)$ in the form of a + ib

A. $\frac{24}{13}i$

B. $\frac{27}{13}i$

C. $\frac{28}{13}i$

D. $\frac{30}{13}i$

Answer: A

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18. Express $\frac{1}{1 - \cos\theta + i\sin\theta}$ in the form of $a + ib$

A. $\frac{1}{2} - \frac{i}{2}\cot\left(\frac{\theta}{2}\right)$

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

C. $\frac{1}{2} - \frac{i}{2}\tan\theta$

D. none

Answer: A

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19. Express $\frac{1}{1+\cos 2\theta+i\sin 2\theta}$ in the form of x + iy

A. $\frac{1}{2}-\frac{i}{2}i\sin\theta$

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

C. $\frac{1}{2}-\frac{i}{2}\tan\theta$

D. none

Answer: C

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20. Express $\frac{1}{1+\cos 2\theta-i\sin 2\theta}$ in the form of x + iy

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

B. $\frac{1}{2}+\frac{i}{2}\cos\theta$

C. $\frac{1}{2}+\frac{i}{2}\tan\theta$

D. none

Answer: C

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21. Express $\dfrac{4+3i}{(2+3i)(4-3i)}$ in the form of x + iy

A. $\dfrac{86}{325}+\dfrac{27}{325}i$

B. $\dfrac{72}{325}+\dfrac{27}{325}i$

C. $\dfrac{68}{325}+\dfrac{27}{325}i$

D. none

Answer: A

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22. $\dfrac{1}{i-1}+\dfrac{1}{i+1}$ is

A. purely imaginary

B. positive rational

C. irrational

D. integer

Answer: A

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23. $\left(\frac{1+i}{1-i}\right)^4+\left(\frac{1-i}{1+i}\right)^4=$

A. 0

B. 1

C. 2

D. 4

Answer: C

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24. The modulus of $(-5, 12)$ is

A. 13

B. $\sqrt{13}$

C. $\sqrt{13}/2$

D. $\sqrt{13}/\sqrt{2}$

Answer: A

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25. The modulus of $(-5, 12)$ is

A. 13

B. $\sqrt{13}$

C. $\sqrt{13}/2$

D. $\sqrt{13}/\sqrt{2}$

Answer: A

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26. The modulus of $\dfrac{5+4i}{1+i}$ is

A. $\sqrt{41}/2$

B. $\sqrt{41/2}$

C. $41/\sqrt{2}$

D. $\sqrt{41}/\sqrt{2}$

Answer: B

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

A. 5

B. $\sqrt{5}$

C. $5\sqrt{2}$

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

Answer: A

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

A. 1

B. $1/2$

C. $\sqrt{2}$

D. $1/\sqrt{2}$

Answer: D

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29. $|1+\cos\theta+i\sin\theta| =$

A. $\cos(\theta/2)$

B. $\sin(\theta/2)$

C. $2\sin(\theta/2)$

D. $2\cos(\theta/2)$

Answer: D

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30. If θ is real then the modulus of $\dfrac{1}{1+\cos\theta+i\sin\theta}$ is

A. $\dfrac{1}{2}\sec.\ \dfrac{\theta}{2}$

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

C. $\sec.\ \dfrac{\theta}{2}$

D. $\cos . \frac{\theta}{2}$

Answer: A

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

A. $\sqrt{8}/5$

B. $8/25$

C. $25/8$

D. none

Answer: B

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32. If α and β are real them $\left|\frac{\alpha+i\beta}{\beta+i\alpha}\right|=$

A. lies between 0 and 1

B. 1

C. > 1

D. none

Answer: B

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33. The conjugate of $(2, -3) + (3, 4)$ is

A. (5,1)

B. (5,-1)

C. (-5,1)

D. none

Answer: B

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34. The 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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35. The conjugate of $\cos\theta - i\sin\theta$ is

A. $\cot\theta + i\sin\theta$

B. $\cos\theta + i\tan\theta$

C. $\tan\theta + i\sin\theta$

D. $\cos\theta + i\sin\theta$

Answer: D

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36. The complex number $\sin x + i\cos 2x$ and $\cos x - i\sin 2x$ are conjugate to each other for

A. $x = n\pi$

B. $x = (n + 1/2)\pi$

C. $x = 0$

D. none

Answer: D

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37. The conjugate of $\frac{2+3i}{1+2i}$ is

A. $\frac{8+i}{5}$

B. $\frac{8-i}{5}$

C. $\frac{2+3i}{5}$

D. $\frac{2-3i}{5}$

Answer: A

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

A. $\frac{2}{25}+\frac{11}{25}i$

B. $\frac{2}{25}-\frac{11}{25}i$

C. $-\frac{2}{25}+\frac{11}{25}i$

D. $-\frac{2}{25}-\frac{11}{25}i$

Answer: D

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

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

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

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

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

Answer: B

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40. The least positive integral value of n for which $\left(\frac{1+i}{1-i}\right)^n = 1$is

A. 2

B. 3

C. 4

D. 5

Answer: C

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41. The least positive integer n for which $(1+i)^n = (1-i)^n$ holds is

A. 2

B. 4

C. 6

D. 8

Answer: B

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42. The least positive integer n for which $\frac{(1+i)^n}{((1-i))^{n-2}}$ is a real number is

A. 2

B. 1

C. 3

D. 5

Answer: B

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43. The least positive integral value of n for which $\left(\frac{1-i}{1+i}\right)^{2n}$ = 1 is

A. 2

B. 4

C. 6

D. 14

Answer: A

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

A. x = 4n where n is any positive integer

B. x = 2n where n is any positive integer

C. x = 4n + 1 where is any positive integer

D. x = 2n +1 where n is any positive integer

Answer: A

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45. If $\frac{(1-i)^{2n}}{(1+i)^{2n+1}}$ is real number then

A. n= 1

B. n=2

C. no n exists

D. none

Answer: C

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46. $(1-i)^6 + (1-i)^3 =$

A. 1,2+I

B. $2-10i$

C. $-2+i$

D. `-2+12i

Answer: D

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47. If $\left(\frac{1+i}{1-i}\right)^3 - \left(\frac{1-i}{1+i}\right)^3 = a + ib,$ then (a ,b) =

A. 1,1

B. 2,-2

C. 0,-1

D. 0,-2

Answer: D

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48. $\frac{(1+i)x - i}{2+i} + \frac{(1+2i)y + i}{2-i} = 1 \Rightarrow (x, y) =$

A. (0,0)

B. (3,1)

C. (3,-1)

D. (-3,1)

Answer: C

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49. $\frac{(1+i)x-i}{2+i}+\frac{(1+2i)y+i}{2-i}=1 \Rightarrow (x, y)=$

A. $\left(\frac{7}{3}, -\frac{7}{15}\right)$

B. $\left(\frac{7}{3}, \frac{7}{15}\right)$

C. $\left(\frac{7}{5}, -\frac{7}{15}\right)$

D. $\left(\frac{7}{5}, \frac{7}{15}\right)$

Answer: A

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50. $\frac{(1+i)^{2011}}{(1-i)^{2009}}=$

A. -1

B. 1

C. 2

D. -2

Answer: D

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51. $\dfrac{(1+i)^{2016}}{(1-i)^{2014}}$ =

A. $-2i$

B. 2i

C. 2

D. -2

Answer: A

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52. If $\frac{(1+i)^2}{2-i} = (x+iy) \text{ then } x+y=$

A. $-2/5$

B. $6/5$

C. $2/5$

D. none

Answer: C

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53. If $\begin{vmatrix} 1-i & i \\ 1+2i & -1 \end{vmatrix} = x+iy, \text{then } x=$

A. 1

B. -1

C. 2

D. -2

Answer: A

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54. $x+iy=\frac{1}{1+\cos\theta+i\sin\theta}, \text{ then } \ 4x^2=$

A. 0

B. 1

C. 2

D. 3

Answer: B

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55. If $u+iv=\frac{3i}{x+iy+2}$, then y in terms of u,v is

A. $\dfrac{3u}{u^2+v^2}$

B. $\dfrac{4u}{u^2+v^2}$

C. $\dfrac{5u}{u^2+v^2}$

D. $\dfrac{2u}{u^2+v^2}$

Answer: A

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56. If $u+iv=\dfrac{2+i}{z+3}$ and $z=x+iy$ find u, v

A. $\dfrac{2(x+3)+y}{(x+3)^2+y^2}+,\dfrac{x-2y+3}{(x+3)^2+y^2}$

B. $\dfrac{2(x+2)+y}{(x+2)^2+y^2},\dfrac{x-2y+3}{(x+2)^2+y^2}$

C. $\dfrac{2(x+4)+y}{(x+4)^2+y^2}+,\dfrac{x-2y+3}{(x+4)^2+y^2}$

D. none

Answer: A

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57. If $\frac{3}{2+\cos\theta+i\sin\theta}=x+iy$ then (x-1)(x-3)=

A. y^2

B. $-y^2$

C. 0

D. 1

Answer: B

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58. If $(1+\cos\theta+i\sin\theta)(1+\cos 2\theta+i\sin 2\theta)=x+iy$ then y =

A. $x\tan(3\theta/2)$

B. $x\tan(5\theta/2)$

C. $x\tan(7\theta/2)$

D. $x \tan(9\theta / 2)$

Answer: A

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59. If $(a+ib)^2 = x+iy$ then x^2+y^2 =

A. 0

B. 1

C. $(a^2+b^2)^2$

D. $(a^2-b^2)^2$

Answer: C

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60. If $\sqrt{\left[\frac{a-ib}{c-ib}\right]}$ then $(x^2+y^2)^2 =$

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

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

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

D. $\frac{(a^2-b^2)}{(c^2-d^2)}$

Answer: C

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61. If $a, b, c, d \in \mathbb{R}$ are such that $a^2+b^2=4$ and $c^2+d^2=2$ and if $(a+ib)^2=(c+id)^2(x+iy)$ then $x^2+y^2=$

A. 4

B. 3

C. 2

D. 1

Answer: A

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62. If $\frac{(2+3i)}{(7-i)(4-2i)} = A + iB \text{ then } A^2 + B^2 =$

A. $13/100$

B. $13/1000$

C. $17/100$

D. $17/1000$

Answer: B

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63. If $z = x - iy$ and $z^{\frac{1}{3}} = p + iq, \quad \text{then} \left(\frac{x}{p} + \frac{y}{q}\right) / \left(p^2 + q^2\right) =$

A. 1

B. -2

C. 2

D. -1

Answer: B

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64. If z = x + iy $iscomp \le x\nu mbersuchz$^(1-//3) = a+ib, $thenthevalueof$

1/(a^2+b^2)(x/a+y/b)=`

A. -1

B. -2

C. 0

D. 2

Answer: B

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65. If $(1-i)(1-2i)(1-3i).....(1-ni) = x - iy$, then $2.5.10......(1+n^2) =$

A. $x^2 + y^2$

B. $x + y$

C. $x^2 - y^2$

D. $x - y$

Answer: A

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66. If $(a_1 + ib_1)(a_2 + ib_2)....... (a_n + ib_n) = A + iB,$ then $(a_1^2 + b_1^2)(a_2^2 + b_2^2)$

A. $A^2 + B^2$

B. $A^2 - B^2$

C. $A^3 + B^3$

D. $A^3 - B^3$

Answer: A

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67. If $|z_1| = 1, |z_2| = 2, |z_3| = 3$ and $|9z_1z_2 + 4z_1z_3 + z_2z_3| = 12$, then the value of $|\bar{z}_1 + \bar{z}_2 + \bar{z}_3|$ is

A. 3

B. 4

C. 8

D. 2

Answer: D

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68. If $(1 + \cos\theta - i\sin\theta)(1 + \cos 2\theta + i\sin 2\theta) = x + iy$ then $x^2 + y^2$ =

A. $16\cos^2\theta\sin^2(\theta/2)$

B. $16\sin^2\theta\cos^2(\theta/2)$

C. $16\sin^2\theta\sin^2(\theta/2)$

D. $16\cos^2\theta\cos^2(\theta/2)$

Answer: D

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69. $\sqrt{-5 + 12i} =$

A. $\pm(2 + 3i)$

B. $\pm(2 - 3i)$

C. $\pm(2 + 4i)$

D. $\pm(2 - 4i)$

Answer: A

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70. $\sqrt{-3-4i} =$

A. $\pm(1+3i)$

B. $\pm(1-3i)$

C. $\pm(1+2i)$

D. $\pm(1-2i)$

Answer: D

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71. $\sqrt{4ab-2i(a^2-b^2)}$ =

A. $\pm\left\{\frac{(a-b)+i(a+2b)}{2}\right\}$

B. $\pm\{(i+5b)+i(a-4b)\}$

C. $\pm\{(a+5b)+i(a-b)\}$

D. $\pm\{(i+b)+i(a-b)\}$

Answer: C

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72. If $z=2+3i$, then $z\bar{z}$ =

A. 13

B. -13

C. $\sqrt{13}$

D. $-\sqrt{13}$

Answer: A

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73. If $z = 3 + i$, then $(z + 1)(\bar{z} + 1) =$

A. 17

B. -17

C. $\sqrt{17}$

D. $-\sqrt{17}$

Answer: A

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74. If $z = 3 - 5i$ Show that $z^3 - 10z^2 + 58z - 136 = 0$

A. 0

B. 1

C. 2

D. 3

Answer: A

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75. If $x = -5 + 4i$ then $x^4 + 9x^3 + 35x^2 - x + 4 =$

A. -170

B. 160

C. 170

D. -160

Answer: D

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76. If z = 3 + 5i then $z^3 + \bar{z} + 198 =$

A. $-3 - 5i$

B. $-3+5i$

C. $3-5i$

D. $3+5i$

Answer: D

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77. Let $z=a-\frac{i}{2}, a \in \mathbb{R}$ Then $|i+z|^2-|i-z|^2=$

A. 2

B. -2

C. 4

D. -4

Answer: B

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78. If the first term and common ratio of a G.P are both $(1/2)(\sqrt{3}+i)$, then the absolute value of its n^{th} term is

A. 2^n

B. 3^n

C. 1

D. none

Answer: C

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79. $\sum_{n=0}^{\infty}\left(\frac{2i}{3}\right)^n =$

A. $\frac{9+6i}{13}$

B. $\frac{9-6i}{13}$

C. 9+6i

D. $9 - 6i$

Answer: A

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80. If $(a_1 + ib_1)(a_2 + ib_2)......(a_n + ib_n) = A + iB$, then $\tan^{-1}\left(\frac{b_1}{a_1}\right) + \tan^{-1}$

A. $n\pi - \tan^{-1}\left(\frac{B}{A}\right)$

B. $n\pi + \tan^{-1}\left(\frac{B}{A}\right)$

C. $n\pi + \tan^{-1}(A + B)$

D. none

Answer: B

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81. The real value of θ for which the expression $\dfrac{1-i\sin\theta}{1+2i\sin\theta}$ is a real number is

A. $\theta = n\pi$

B. $\theta = n\pi/2$

C. $\theta = n\pi/3$

D. none

Answer: A

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82. If $\dfrac{1-\sin\theta}{1+2i\sin\theta}$ is purely imaginary then $\theta =$

A. $n\pi \pm \dfrac{\pi}{3}, n \in Z$

B. $n\pi + (-1)\dfrac{\pi}{2}, n \in Z$

C. $n\pi \pm \dfrac{\pi}{4}, n \in Z$

D. none

Answer: B

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83. If $\frac{3+2i\sin\theta}{3-2i\sin\theta}$ is real , then θ =

A. π

B. $\pi/2$

C. $\pi/3$

D. $\pi/6$

Answer: A

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

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

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

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

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

Answer: D

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85. If $\frac{\tan\alpha - i[\sin(\alpha/2) + \cos(\alpha/2)]}{1 + 2i\sin(\alpha/2)}$ is purely imaginary , is

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

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

C. $2n\pi \pm \frac{\pi}{4}$

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

Answer: A

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86. Find the general value of x if the expression $\frac{\sin\frac{x}{2}+\cos\frac{x}{2}+i\tan x}{1+2i\sin\frac{x}{2}}$ is real .

A. $n\pi \quad \text{or} \quad n\pi\frac{\pi}{4}$

B. $2n\pi \quad \text{or} \quad n\pi\frac{\pi}{4}$

C. $n\pi \quad \text{or} \quad n\pi\frac{\pi}{2}$

D. none

Answer: B

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87. The principal value of the argument $-\sqrt{3}+i$ is

A. $2\pi/3$

B. $5\pi/6$

C. $\pi/6$

D. $-\pi/6$

Answer: B

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88. The amplitude of $1+\cos\theta+i\sin\theta$ is

A. θ

B. $\theta/2$

C. $\theta/3$

D. none

Answer: B

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

A. $\pi/3$

B. $-\pi/3$

C. $\pi/6$

D. $-\pi/6$

Answer: C

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90. If $\pi/5$ and $\pi/3$ are the arguments of $\bar{z}_1$ and z_2 then the value of $arg(z_1)+arg(z_2)$ is

A. $6\pi/15$

B. $\pi/15$

C. $2\pi/15$

D. $4\pi/15$

Answer: C

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91. If $\pi/3$ and $\pi/4$ are the arguments of z_1 and $\bar{z}_2$ then the value of arg $(z_1 . z_2)$

A. $5\pi/12$

B. $\pi/12$

C. $7\pi/12$

D. $-\pi/12$

Answer: B

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92. If $2\pi / 3$ and $\pi / 6$ are the arguments of $\bar{z}_1$ and z_2 then value of arg (z_1 / z_2) is

A. $-5\pi / 6$

B. $-\pi / 6$

C. $5\pi / 6$

D. $\pi / 6$

Answer: A

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93. $z = 1 + i\sqrt{3} \Rightarrow |Argz| + |Arg\bar{z}| =$

A. 0

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

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

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

Answer: D

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94. If z_1 and z_2 are two non - zero complex numbers such that $|z_1 + z_2| = |z_1| + |z_2|$ then $Argz_1 - Argz_2$ is

A. $-\pi$

B. $-\pi/2$

C. 0

D. $\pi/2$

Answer: C

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95. If z_1 and z_2 are two non - zero complex numbers such that $|z_1 + z_2| = |z_1 - z_2|$, then $Argz_1 - Argz_2$ is

A. $-\pi$

B. $-\pi/2$

C. 0

D. $\pi/2$

Answer: D

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96. If z is a complex number of unit modulus and argument θ then, arg $\left(\frac{1+z}{1+z^{-}}\right)$ equals:

A. θ

B. $\pi-\theta$

C. $-\theta$

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

Answer: A

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97. Let z,w be complex number such that $\bar{z} + i\overline{w} = 0$ and arg zw $= \pi$.

Then arg z =

A. $\pi / 4$

B. $5[i / 4$

C. $3\pi / 4$

D. $\pi / 2$

Answer: C

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98. If z and ω are two nonzero complex numbers such that

$|z\omega| = 1$ and $\text{Arg}(z) - Arg(\omega)$ =pi//2 " then " barzomega` =

A. 1

B. -1

C. i

D. $-i$

Answer: D

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

A. (1,0)

B. (-1,1)`

C. (0,1)

D. (1,1)

Answer: D

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100. The polar form of $1+\sqrt{3}i$ is

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

B. $2\left(cis\frac{\pi}{3}\right)$

C. $2\left(cis\frac{\pi}{4}\right)$

D. none

Answer: B

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101. The mod -amplitude form of $\sqrt{3}-i$ is

A. $2cis\frac{5\pi}{6}$

B. $2cis\left(\frac{-\pi}{6}\right)$

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

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

Answer: B

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102. The mod -amplitude form of $-\sqrt{3}-i$ is

A. $2cis\left(\frac{5\pi}{6}\right)$

B. $2cis\left(\frac{-5\pi}{6}\right)$

C. $2cis\left(-\frac{\pi}{6}\right)$

D. $2cis\left(\frac{\pi}{6}\right)$

Answer: B

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103. The mod -amplitude form of $1-\sqrt{3}i$

A. $2cis\left(\frac{2\pi}{3}\right)$

B. $2cis\left(\frac{-2\pi}{3}\right)$

C. $2cis\left(\frac{-\pi}{3}\right)$

D. $2cis\left(\frac{\pi}{3}\right)$

Answer: C

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104. The mod -amplitude form of $5+12i$ is

A. $13cis\theta, \tan\theta = 12/5$

B. $13cis\theta, \sin\theta = 12/5$

C. $13cis\theta, \cos\theta = 12/5$

D. $13cis\theta, \cot\theta = 12/5$

Answer: A

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105. The mod -amplitude form of $\frac{1+7i}{(2-i)^2}$ is

A. $\sqrt{2}cis\frac{3\pi}{4}$

B. $cis\left(\frac{\pi}{3}\right)$

C. $cis\left(\frac{-\pi}{3}\right)$

D. $cis\left(\frac{3\pi}{3}\right)$

Answer: A

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106. The mod -amplitude form of $1+i\tan\theta$ is

A. $cis\theta\sec\theta$

B. $cis\frac{\theta}{2}$

C. $cis\left(\frac{\pi}{2}-\theta\right)$

D. $cis\left(\frac{\pi}{2}+\theta\right)$

Answer: A

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107. The mod -amplitude form of $1+\cos\theta-i\sin\theta$ is

A. $2\cos.\ \frac{\theta}{2}.\ cis\left(-\frac{\theta}{2}\right)$

B. $2\cos.\ \frac{\theta}{2}.\ cis\left(\frac{\pi}{2}-\frac{\theta}{2}\right)$

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

D. $\cos.\ \frac{\theta}{2}.\ cis\left(-\frac{\theta}{2}\right)$

Answer: A

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108. The mod -amplitude form of $\sin\theta-i\cos\theta$ is

A. $cis\theta$

B. $cis\left(\frac{\pi}{2}+\frac{\theta}{2}\right)$

C. $cis\left(\frac{\pi}{2}+\theta\right)$

D. none

Answer: D

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109. If $\frac{\pi}{2} < \alpha\frac{3\pi}{2}, the \bmod \underline{u}sargumentf \text{ or } mof$(1 + cos 2 alpha) + isin 2 alpha` is

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

B. $2\cos\alpha\{\cos(\alpha)+i\sin\alpha)$

C. $2\cos\alpha\{\cos(-\alpha)+i\sin(-\alpha)\}$

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

Answer: A

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110. If $(\cos 3\alpha + i \sin 3\alpha)(\cos 5\beta + i \sin 5\beta) = \cos\theta + i \sin\theta \text{ then } \theta$ is

A. $2\alpha + 3\beta$

B. $3\alpha + 6\beta$

C. $3\alpha + 5\beta$

D. $2\alpha + 4\beta$

Answer: C

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111. If $x + iy = cis, \alpha, cis\alpha$ then value of $x^2 + y^2$

A. 0

B. 1

C. -1

D. 2

Answer: B

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112. If $cis\alpha. cis\beta. cis\gamma = cisx$ then the value of x is

A. $\alpha + \beta + \gamma$

B. $\alpha + \beta - \gamma$

C. $\alpha - \beta + \gamma$

D. $\alpha - \beta - \gamma$

Answer: A

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113. If A,B,C are angles of a triangle such that $x = cisA, y = cisB, z = cisC$, then find the value of xyz .

A. 0

B. 1

C. -1

D. 2

Answer: C

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114. For any two complex numbers z_1, z_2 and real numbers a and b , $|az_1 - bz_2|^2 + |bz_1 + az_2|^2 =$

A. $(a^2 - b^2)\left(|z_1|^2 + |z_2|^2\right)$

B. $(a^2 + b^2)\left(|z_1|^2 + |z_2|^2\right)$

C. $(a^2 + b^2)\left(|z_1|^2 - |z_2|^2\right)$

D. None

Answer: B

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115. If $|z_1| = |z_2| = 1, then |z_1 + z_2|$ =

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

B. $\left|\frac{1}{z_1} - \frac{1}{z_2}\right|$

C. $\left|\frac{1}{z_1} . \frac{1}{z_2}\right|$

D. none

Answer: A

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116. If $\frac{5z_2}{7z_1}$ is purely imaginary , then $\left|\frac{2z_1 + 3z_2}{2z_1 - 3z_2}\right| =$

A. $5/7$

B. $7/9$

C. $25/49$

D. 1

Answer: D

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

A. ab

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

C. $\dfrac{a^2-b^2}{2ab}$

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

Answer: B

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118. If $|z-4/z|=2$ then the greatest value of |z| is

A. $\sqrt{5}$

B. $\sqrt{5}+1$

C. $\sqrt{5}-1$

D. $1-\sqrt{5}$

Answer: B

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119. The maximum value of |z| when z satisfies the condition |z+2/z|=2 is

A. $\sqrt{3}-1$

B. $\sqrt{3}+1$

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

D. $\sqrt{3}$

Answer: B

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120. The minimum value of $|z-1|+|z-5|$ is

A. 5

B. 4

C. 3

D. 2

Answer: B

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121. If z_1, z_2 are two complex numbers satisfying $\left|\frac{z_1-3z_2}{3-z_1\bar{z}_2}\right|=1, |z_1|\neq 3$ then $|z_2|=$

A. 1

B. 2

C. 3

D. 4

Answer: A

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122. If the point $z = (1+i)(1+2i)(1+3i)...(1+10i)$ lies on a circle with centre at origin and radius r, then r^2 =

A. $10!$

B. $2 \times 3 \times 4 \times .... \times 10$

C. $2 \times 5 \times 10 \times ..... \times 101$

D. $11!$

Answer: C

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123. If |z-1| = 2 then the locus of z is

A. $x^2 + y^2 + 2x + 3 = 0$

B. $x^2 + y^2 + 2x - 3 = 0$

C. $x^2 + y^2 - 2x + 3 = 0$

D. $x^2 + y^2 - 2x - 3 = 0$

Answer: D

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124. If |3z-2|=5 then the locus of z is

A. $9x^2 + 9y^2 + 12x - 21 = 0$

B. $9x^2 + 9y^2 - 12x - 21 = 0$

C. $9x^2 + 9y^2 + 12x + 21 = 0$

D. $9x^2 - 9y^2 + 12x - 21 = 0$

Answer: B

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125. If |z-3+i| = 4 then the locus of z = x +iy is

A. $x^2 + y^2 - 6x + 2y - 6 = 0$

B. $x^2 + y^2 - 6 = 0$

C. $x^2 + y^2 - 3x + y - 6 = 0$

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

Answer: A

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126. If $\left|\frac{z-1}{z-3}\right|$ = 2 then the locus of z = x +iy is

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

B. $x^2 + y^2 - 4x - 6y - 12 = 0$

C. $x^2 + y^2 - 3x - 2y = 0$

D. $3x^2 + 3y^2 - 22x + 35 = 0$

Answer: D

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127. The locus of the point z = x +iy satisfying the equation $\left|\frac{z-1}{z+1}\right| = 1$ is given n=by

A. x = 0

B. y = 0

C. x = y

D. x + y = 0

Answer: A

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128. If $\left|\frac{z-a}{z+a}\right|=1$ where Re $(a)\neq 0$ then locus of z = x +iy is

A. y = 0

B. x = 0

C. $x^2+y^2+2x-4y=0$ such that $y<0, x^2+y^2>1$

D. $x^2+y^2+2x-4y=0$ such that $2x-y+4>0$

Answer: B

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129. If $\left|\frac{z-i}{z+i}\right|=1$ then the locus of z is

A. y = 0

B. y = 1

C. y = 2

D. y = 3

Answer: A

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130. The equation of the locus of 2 such that $\left|\frac{z-i}{z+i}\right| = 2$, where z = x + iy is a complex number , is

A. $3x^2 + 3y^2 + 10y - 3 = 0$

B. $3x^2 + 3y^2 + 10y + 3 = 0$

C. $3x^2 + 3y^2 - 10y - 3 = 0$

D. $x^2 + y^2 - 5y + 3 = 0$

Answer: B

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131. The locus of the point z = x + iy satisfying $\left|\frac{z-2i}{z+2i}\right| = 1$ is

A. x - axis

B. y - axis

C. y = 2

D. x = 2

Answer: A

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132. If $\left|\frac{z+4i}{z-2}\right| = 2$ then the locus of z is

A. a circle with centre 0

B. a real circle

C. an imaginary

D. none

Answer: B

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133. The complex number z = x + iy which satisfy the equation $\left|\frac{z-5i}{z+5i}\right| = 1$ lie on

A. x - axis

B. y = 5

C. circle passing through origin

D. none

Answer: A

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134. The complex equation |z+1-i|=|z+i-1| represents a

A. Straight line

B. circle

C. parabola

D. Hyperbola

Answer: A

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135. The locus represented by |z-1|=|z+i| is

A. a circle of radius 1

B. an ellipse with focii at (1,0),(0,-1)

C. a straight line through the origin

D. a circle on the line joining (1,0),(0,1) as diameter

Answer: C

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136. If a is real number such that |z-ai|=|z+ai| , then the locus of z is

A. x - axis

B. y - axis

C. x = y

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

Answer: A

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137. In the Argand Diagrams , all the complex number z satisfying $|z - 4i| + |z + 4i| = 0$ lie on a

A. Straight line

B. circle

C. ellipse

D. parabola

Answer: A

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138. The locus of z satisfying |z|+|z-1|= 3 is

A. a circle

B. a pair of straight lines

C. an ellipse

D. a parabola

Answer: C

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

A. an ellipse

B. a circle

C. a straight line

D. a parabola

Answer: C

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140. The locus of the point z in the argrand plane for which $|z+1|^2 + |z-1|^2 = 4$ is a

A. Straight line

B. pair of straight lines

C. circle

D. parabola

Answer: C

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141. The locus of z such that $|z-1|^2+|z+1|^2=4$ is a

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

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

C. $x^2+2y^2=2$

D. none

Answer: B

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142. If $|z+i|^2-|z-i|^2=3$ then the locus of z is

A. 4y = 0

B. 4y = 2

C. 4y = 3

D. 4y = 4

Answer: C

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143. If $z = x + iy$ is a complex number satisfying $|z + i/2|^2 = |z - i/2|^2$ then the locus of z is

A. x - aixs

B. y - axis

C. y = x

D. 2y = x

Answer: A

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144. The points representing the complex numbers z for which $|z + 4|^2 - |z - 4|^2 = 8$ lie on

A. a straight line parallel to x - axis

B. a straight line parallel to y - axis

C. a circle with centre as origin

D. a circle with centre other than the origin

Answer: B

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145. The locus of the point representing the complex number z for which $|z+3|^2-|z-3|^2=15$ is

A. a circle

B. a parabola

C. a straight line

D. an ellipse

Answer: C

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146. If a complex number $\left|z^2 - 1\right| = |z|^2 + 1$, then z lies on :

A. the real axis

B. the imaginary axis

C. y = x

D. a circle

Answer: B

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147. If $\left|z + \bar{b}\right| = |z - \bar{z}|$, then the locus of z is

A. a pair of straight lines

B. a rectangular hyperbola

C. a line

D. a set of four lines

Answer: A

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148. If $|z+\bar{z}|+|z-\bar{z}|=2$, then z lies on

A. a straight lines

B. a square

C. a circle

D. none

Answer: A

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149. If a complex number $\left|z^2-1\right|=|z|^2+1$, then z lies on :

A. the real axis

B. an ellipse

C. a circle

D. the imaginary axis

Answer: D

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150. If amp (z-i) $= \pi / 3$ then the locus of z is

A. $\sqrt{3}x - y + 1 = 0, x > 0, y > 1$

B. $\sqrt{3}x + y - 1 = 0,$

C. $\sqrt{3}x - y - 1 = 0,$

D. $\sqrt{3}x + y + 1 = 0,$

Answer: A

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151. If amp $(z-3)=\pi/2$ then the locus of z is

A. x = 0

B. x = 2n

C. x = 3 such that $y>0$

D. x = 4

Answer: C

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152. If the amplitude of $z-2-3i$ is $\pi/4$, 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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153. If Arg (3z-2i) = pi//2 then the locus of z = x +iy is

A. $x^2 + y^2 + 3x - 2 = 0, y = 0$

B. x = 0 such that $y > 2/3$

C. $x^2 + y^2 + 2x - 4y = 0 \text{such that} y < 0, x^2 + y^2 > 1$

D. $x^2 + y^2 + 2x - 4y = 0 \text{such that} 2x - y + 4 = 0$

Answer: B

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154. If Arg $\left(\frac{z+1}{z-1}\right) = \frac{\pi}{6}$ then the locus of z = x + iy is

A. $x^2 + y^2 + 3x - 2 = 0, y = 0$

B. x = 0 such that $y > 2/3$

C. $x^2 + y^2 + 2\sqrt{3}y - 1 = 0 \text{ such that } < 0, x^2 + y^2 > 1$

D. $x^2 + y^2 + 2x - 4y = 0 \text{ such that } 2x - y + 4 > 0$

Answer: C

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155. The locus of the complex number z such that arg $\left(\frac{z-2}{z+2}\right) = \frac{\pi}{3}$ is :

A. a circle

B. a straight line

C. a parabola

D. an ellipse

Answer: A

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156. If Amp $\left(\frac{z+2}{z-4i}\right)=\frac{\pi}{2}$ then the locus of z = x + iy is .

A. $x^2+y^2+3x-2=0, y=0$

B. $x=0 \text{ such that } y>2/3$

C. $x^2+y^2+2x-4y=0 \text{ such that } y>0, x^2+y^2>1$

D. $x^2+y^2+2x-4y=0 \text{ such that } 2x-y+4>0$

Answer: D

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157. The points in the set $\left\{z \in C: Arg\left(\frac{z-2}{Z-6i}\right)=\frac{\pi}{2}\right\}$ lie on the curve which is a (where C denotes the sets of all complex number)

A. circle

B. pair of lines

C. parabola

D. hyperbola

Answer: A

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158. If Re $\left(\frac{z+3}{z-2i}\right)=0$ then the locus of z = x +iy is

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

B. $x^2+y^2-4x-6y-12=0$

C. $x^2+y^2+3x-2y=0$

D. $3x^2+3y^2-22x-35=0$

Answer: C

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159. If Im $\left(\frac{z-1}{z+1}\right)=0$ then the locus of z = x + iy is

A. y = 0

B. y = 2

C. y = 3

D. y = 4

Answer: A

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160. If Re $\left(z^2\right)=2$ then the locus of z is

A. $xy=1, x^2-y^2=0$

B. $xy=0, x^2-y^2=2$

C. $xy=0, x^2-y^2=1$

D. $xy=2, x^2-y^2=0$

Answer: B

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161. If $z(\bar{z}+3)=2$ then the locus of z = x + iy is

A. $x^2+y^2+3x-2=0, y=0$

B. x = 0 such that $y>2/3$

C. $x^2+y^2+3x-2=0, y=0$

D. $x^2+y^2+2x-4y=0$ such that $2x-y+4>0$

Answer: A

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162. If $z\bar{z}=4$ then the locus of z is

A. $x^2+y^2=4$

B. $x^2 + y^2 = 2$

C. $x^2 - y^2 = 2$

D. $x^2 + y^2 = 3$

Answer: A

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163. If $\frac{z-i}{z+1}$ is purely imaginary then the locus of z = x + iy is

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

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

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

D. none

Answer: C

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164. If $\frac{z+2}{z+6i}$ is purely real then the locus of z = x +iy is

A. $3x+y+6=0$

B. $3x+y-6=0$

C. $3x-y-6=0$

D. none

Answer: A

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165. It $z \ne 1$ and $\frac{z^2}{z-1}$ is real , then point represent by the complex number z lies

A. either on the real axis or on a circle not passing through the origin

B. on the imaginary axis

C. either on the real axis or on a circle passing through the origin

D. on a circle with centre at the origin

Answer: C

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

A. Straight line parallel to x - axis

B. Straight line parallel to y - axis

C. Circle of radius 2

D. Circle of radius $\sqrt{2}$

Answer: C

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167. If $z = (\lambda + 3) + i\sqrt{5 - \lambda^2}$ then the locus of z is a circle with centre at

A. (0,0)

B. (0,3)

C. (3,0)

D. (-3,0)

Answer: C

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168. If $\alpha + i\beta = \tan^{-1}(z)$, $z = x + iy$ and α is constant then the 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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169. If $|z-1| > 2|z-2|$ then the locus of z = x + iy is

A. $x^2 + y^2 + 3x - 2 = 0$

B. $3x^2 + 3y^2 - 14x + 15 > 0$

C. $3x^2 + 3y^2 - 14x + 15 < 0$

D. $3x^2 + 3y^2 - 14x + 15 = 0$

Answer: B

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170. The region represented by $|z+a| + |z-a| < 4a$ is

A. $x^2 + y^2 < 4a^2$

B. $x^2 + y^2 > 4a^2$

C. $x^2 - y^2 < 4a^2$

D. none

Answer: D

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171. The region of the argand plane defined by $|z - i| + |z + i| \leq 4$ is

A. interior of an ellipse

B. exterior of a circle

C. interior and boundary of a ellipse

D. none

Answer: C

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172. The locus of z satisfying the inequality $\left|\frac{z+2i}{2z+i}\right| < 1$ where z = x + iy , is :

A. $x^2 + y^2 > 1$

B. $x^2 - y^2 < 1$

C. $x^2 - y^2 > 1$

D. $2x^2 + 3y^2 < 1$

Answer: A

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173. The locus of z satisfying the inequality $\log_{1/3}|z+1| > \log_{1/3}|z-1|$

A. $Re(z) > 0$

B. $Re(z) < 0$

C. $\mathrm{Im}(z) > 0$

D. $\text{Im}(z) < 0$

Answer: B

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174. If $\log \tan_{30}^{\circ}\left(\frac{2|z|^2 + 2|z| - 3}{|z| + 1}\right) < -2$, then

A. $|z| < 3/2$

B. $|z| > 3/2$

C. $|z| > 2$

D. $|z| < 2$

Answer: C

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175. $|z - 4| < |z - 2|$ represents the region given by

A. Re $(z) > 3$

B. Re $(z) < 3$

C. Im $(z) > 3$

D. Im $(z) < 3$

Answer: A

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

A. $\sqrt{5} + 1$

B. 2

C. $2 + \sqrt{2}$

D. $\sqrt{3} + 1$

Answer: A

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

A. is strictly greater than $\frac{5}{2}$

B. is strictly greater than $\frac{3}{2}$ but less than $\frac{5}{2}$

C. is equal to $\frac{5}{2}$

D. lies in the interval (1,2)

Answer: D

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178. The number of complex number z such |z-1|=|z+1|=|z-i| equals

A. 0

B. 1

C. 2

D. ∞

Answer: B

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179. The number of solutions for $z^3 + \bar{z} = 0$ is

A. 1

B. 2

C. 3

D. 5

Answer: D

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180. The triangle formed by the points 1, $\frac{1+i}{\sqrt{2}}$ and i as vertice in the Argrand diagram is

A. scalane

B. equilateral

C. isosceles

D. right angled

Answer: C

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181. If $z_1 = 1 + 2i, z_2 = 2 + 3i, z_3 = 3 + 4i,$ then z_1, z_2 and z_3 represents the vertices of

A. equilateral triangle

B. right angled triangle

C. isosceles triangle

D. none

Answer: C

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182. In the Argrand plane, the points represented by the complex numbers $1+2i, 2+3i \text{ and } -4-3i$ form

A. collinear

B. right angled triangle

C. equilateral triangle

D. none

Answer: A

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183. In the Argrand plane, the points represented by the complex numbers $2 - i, \ - 4 + 3i$ and $- 3 - 2i$ form

A. right angled triangle

B. equilateral triangle

C. isosceles triangle

D. right isosceles triangle

Answer: D

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184. Are of the triangle formed by the three complex numbers, $1 + i, 1 - i, 2i$ in the Argand diagram is

A. $1/2$

B. 1

C. $\sqrt{2}$

D. 2

Answer: B

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185. Area of the triangle formed by the Argrand diagram formed by the complex numbers z , iz and z + iz is

A. $|z|^2$

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

C. $|z|$

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

Answer: B

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186. If $|z| = 3$, then area of the triangle whose sides are z , ωz and $z + \omega z$ (where ω is a complex cube root of unity) is

A. $\frac{9\sqrt{3}}{4}$

B. $\frac{8\sqrt{3}}{4}$

C. $\frac{5}{2}$

D. $\frac{8\sqrt{3}}{3}$

Answer: A

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187. If the area of the triangle on the complex plane formed the points z , iz and z + iz is 50 square units, then |z| is

A. 5

B. 10

C. 15

D. none

Answer: B

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188. If a and b are real number between 0 and 1 such that the points $z_1 = a + I, z_2 = 1 + bi$ and $z_3 = 0$ form an equilateral triangle then a, b, are

A. $2 - \sqrt{3}, 2 - \sqrt{3}$

B. $2 - \sqrt{3}, 2 + \sqrt{3}$

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

D. none

Answer: A

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189. Let z_1, z_2 be two roots of the equation $z^2 + az + b = 0$, z being complex . Further 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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190. If z_1, z_2, z_3 are the vertices of a triangle then its centroid is

A. $z_1 + z_2 + z_3$

B. $\dfrac{z_1 + z_2 + z_3}{3}$

C. $3(z_1 + z_2 + z_3)$

D. none

Answer: B

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191. Let the complex number z_1, z_2, z_3 be the vertices of an equilateral triangle . Let z_0 be the circumcentre of the triangle . Then $z_1^2 + z_2^2 + z_3^2 =$

A. $2z_0^2$

B. $3z_0^2$

C. $4z_0^2$

D. $4z_0^2$

Answer: B

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192. ABC is an isosceles triangle and B=90 . If B and the midpoint P of AC are represented by 3+2i and 1-I then other vertices are

A. 4+ I,-2-3i

B. 4-3i,-2+i

C. 4-I,-2-i

D. none

Answer: B

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193. If three complex number are in A.P then they lie on

A. a straight line

B. a circle

C. a parabola

D. none

Answer: A

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194. If the Argand plane, the points represented by the complex numbers

7-4i,-3+8i,-2-6i and 18i form

A. parallelogram

B. rectangle

C. rhombus

D. square

Answer: A

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195. In the Argand plane, the points represented by the complex numbers

$2-6i, 4-7i, 3-5i$ and $1-4i$ form

A. parallelogram

B. rectangle

C. rhombus

D. square

Answer: C

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196. The condition for the points z_1, z_2, z_3, z_4 taken in order in the Argand plane to be the vertices of a parallelogram is

A. $z_1 + z_2 = z_3 + z_4$

B. $z_1 + z_3 = z_2 + z_4$

C. $z_1 + z_2 = z_3 + z_4 = 0$

D. none

Answer: B

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197. The straight line joining the points in Argrand diagram given by $0+0i$ and $7+7i$ in the Argrand plane is

A. y =x

B. y = 7

C. x = 7

D. y = 0

Answer: A

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198. The equation of the line joining the points represented by 2 - 3i and -3 + 4i in the Argand plane is

A. $7x-5y-1=0$

B. $7x + 5y - 1 = 0$

C. $7x + 5y + 1 = 0$

D. $7x - 5y + 1 = 0$

Answer: C

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199. The equation of the perpendicular bisector of the line joining the points 3 + 3i and 3 - 3i in the Argrand plane.

A. y = 0

B. y = 1

C. y = 2

D. y = 3

Answer: A

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200. If a is a complex number and b is a real number then the equation $\bar{a}z + a\bar{z} + b = 0$ represents

A. Straight line

B. Parabola

C. Circle

D. Hyperbola

Answer: A

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201. Let α, β be real and z be a complex number If $z^2 + \alpha z + \beta = 0$ has two distinct roots on the line Re z = 1 , then it is necessary that :

A. $|\beta| = 1$

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

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

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

Answer: B

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Exercise 2 Special Type Questions Set 1

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

II : $1 + i^2 + i^4 + i^6 + \ldots\ldots i^{2n} = 0$

A. only I is true

B. only II is true

C. both I and II are true

D. neither I nor II are true

Answer: A

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2. I : The additive inverse of $i-2$ is $2-i$

II : The multiplicative inverse of $1-I$ is $1+i$

A. only I is true

B. only II is true

C. both I and II are true

D. neither I nor II are true

Answer: A

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3. The least positive integral value of n for which $\left(\frac{1-i}{1+i}\right)^{2n}$ = 1 is

A. only I is true

B. only II is true

C. both I and II are true

D. neither I nor II are true

Answer: C

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4. I: If z_1 and z_2 are two nonzero complex numbers such that $|z_1 + z_2| = |z_1| + |z_2|$ then $agz_1 - argz_2$ is $\pi/2$

II : If z_1 and z_2 are two complex numbers such that $|z_1 z_2| = 1$ and $argz_1 - argz_2 = \pi/2$ " then " $\bar{z}_1 \bar{z}_2 = -i$

A. only I is true

B. only II is true

C. both I and II are true

D. neither I nor II are true

Answer: B

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5. I : If $z = \bar{z}$ then z is purely imaginary

II: If $|z_1 + z_2| = |z_1| + |z_2|$ then $agz_1 - argz_2$ is $\pi/2$

II: If z_1 and z_2 are two complex numbers such that $|z_1 z_2| = 1$ and $argz_1 - argz_2 = \pi/2$ then $\bar{z}_1, \bar{z}_2 - i$

A. only I is true

B. only II is true

C. both I and II are true

D. neither I nor II are true

Answer: C

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6. If α, β are roots of $x^2 + px + q = 0$ and ω is a cube root of unity then

$I: (\omega\alpha + \omega^2\beta)(\omega^2\alpha + \omega\beta) = p^2 - 3q$ II : $(\omega\alpha - \omega^2\beta)(\omega^2\alpha - \omega\beta) = p^2 -$

III: $(\alpha + \omega\beta)(\alpha + \omega^2\beta) = p^2 - 3q$

A. only I , II is true

B. only II , III is true

C. both I , III are true

D. all I,II , III are true

Answer: D

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Exercise 2 Special Type Questions Set 2

1. The ascending order of the moduli of the complex numbers $z_1 = 1 + I, z_2 = 1 + 2i, z_3 = \dfrac{1-i}{\sqrt{2}}, z_4 = 3 + 4i$ is

A. z_1, z_2, z_3, z_4

B. z_4, z_2, z_1, z_3

C. z_3, z_1, z_2, z_4

D. z_4, z_3, z_2, z_1

Answer: C

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2. Arrange the following values in descending order

$A)(1+\omega)(1+\omega^2)(1+\omega^4)(1+\omega^8)$ B) $(1-\omega+\omega^2)^7+(1+\omega-\omega^2)^7$

$C)(1-\omega)(1-\omega^2)(1-\omega^4)(1-\omega^8)$ D) $(1-\omega+\omega^2)(1-\omega^2+\omega^4)$

A. A,C,D,B

B. B,D,C,A

C. B,C,D,A

D. B,A,D,C

Answer: C

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3. If

$|z_1| = 1, |z_2| = 1$ and $A = Arg(z_1, z_2), B = Arg(z_1 / z_2), C = Arg(z_1 +$

arrange A,B,C,D in ascending order

A. A,C,D,B

B. B,D,C,A

C. B,C,D,A

D. B,A,D,C

Answer: B

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4. For a complex number z

A) Minimum value of |z|+|z-2| B) Minimum value of |z-1|+|z-2|

C) Minimum value of |z-2|+|z-6| D) Minimum value of |z-1|+|z-4|

Arrange the above values in ascending order

A. B,A,D,C

B. C,D,A,B

C. A,B,D,C

D. B,A,C,D

Answer: A

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5. If $\alpha_1, \alpha_2, \alpha_3$ respectively denote the moduli of the complex number $-i, \frac{1}{3}(1+i)$ and $-1+i$, then their increasing order is

A. $\alpha_1, \alpha_2, \alpha_3$

B. $\alpha_3, \alpha_2, \alpha_1$

C. $\alpha_2, \alpha_1, \alpha_3$

D. $\alpha_3, \alpha_1, \alpha_2$

Answer: C

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6. If m_1, m_2, m_3 and m_4 respectively denote the moduli of the complex numbers $1+4i, 3+i, 1-i$ and $2-3i$, then the correct one , among the following is

A. $m_1 < m_2 < m_3 < m_4$

B. $m_4 < m_3 < m_2 < m_1$

C. $m_3 < m_2 < m_4 < m_1$

D. $m_3 < m_1 < m_2 < m_4$

Answer: C

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Exercise 2 Special Type Questions Set 3

1. Match the following

$I.$	$(1-i)(1+2i)(1-3i) =$	a) $6-8i$
$II.$	$(1-i)^6 + (1-i)^3 =$	b) $-2i$
$III.$	$\left(\frac{1+i}{1-i}\right)^3 - \left(\frac{1+i}{1+i}\right)^3 =$	c) $-2-10i$
$IV.$	$\sqrt{-5+12i} =$	d) $2+3i$

A. a,c,b,d

B. b,d,c,a

C. d,b,a,c

D. c,a,b,d

Answer: A

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2. If $x = a + b$, $y = a\omega + b\omega^2$, $z = a\omega^2 + b\omega$ then match the following

$I.$	$x + y + z$	a) $a^3 + b^3$
$II.$	xyz	b) $3(a^3 + b^3)$
$III.$	$x^2 + y^2 + z^2$	c) $6ab$
$IV.$	$x^3 + y^3 + z^3$	d) 0
		e) $2(a^3 + b^3)$

A. d,b,a,e

B. d,e,b,c

C. d,a,c,d

D. d,a,e,b

Answer: C

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3. Match the following

	Complex number	Polar form
$I.$	$1+\sqrt{3}i$	a) $2cis(\pi/3)$
$II.$	$1-\sqrt{3}i$	b) $2cis(-2\pi/3)$
$III.$	$-1+\sqrt{3}i$	c) $2cis(2\pi/3)$
$IV.$	$-1-\sqrt{3}i$	d) $2cis(-\pi/3)$

A. a,c,b,d

B. b,d,c,a

C. a,d,c,b

D. c,a,b,d

Answer: C

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4. Match the following

$I.$	If |z-3+i|=4 then the locus of z is	a) x^2+y^2-6x+2
$II.$	If |z-1|=2|z-3| then the locus of z is	b) $3x^2+3y^2-22x$
$III.$	If |z-i|=|z+i| then the locus of z is	c) $y=0$
$IV.$	If $\|z-1\|^2+\|z+1\|^2=4$ then the locus of z is	d) $x^2+y^2=1$

A. a,c,b,d

B. b,d,c,a

C. a,d,c,b

D. a,b,c,d

Answer: D

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5. If $z = 1 + i\sqrt{3}$ then match the following

$$\begin{array}{lll} I & Arg(z) & \text{a)}5\pi/6 \\ II. & Arg(iz) & \text{b)}-\pi/3 \\ III. & Arg(\bar{z}) & \text{c)}\pi \\ IV. & Arg(i\bar{z}) & \text{d)}\pi/6 \\ & & \text{e)}\pi/3 \end{array}$$

A. e,a,b,c

B. e,b,a,c

C. e,b,a,d

D. e,a,b,d

Answer: D

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6. If $a = \dfrac{1 - i\sqrt{3}}{2}$ then the correct matching of List - I from List - II is

List - I	List - II
i) $a\bar{a}$	A) $2\pi/3$
ii) $arg(1/\bar{a})$	B) $-i/\sqrt{3}$
iii) $a - \bar{a}$	D) 1
iv) $Im(4/3a)$	E) $\pi/3$
	F) $2\sqrt{3}$

Correct match is

A. $\begin{matrix} (\mathrm{i}) & (ii) & (iii) & (iv) \\ D & E & C & B \end{matrix}$

B. $\begin{matrix} (\mathrm{i}) & (ii) & (iii) & (iv) \\ D & A & B & F \end{matrix}$

C. $\begin{matrix} (\mathrm{i}) & (ii) & (iii) & (iv) \\ F & E & B & C \end{matrix}$

D. $\begin{matrix} (\mathrm{i}) & (ii) & (iii) & (iv) \\ D & A & B & C \end{matrix}$

Answer: B

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Exercise 2 Special Type Questions Set 4

1. A : If argument of $z_1 = \pi/3$, argument of $z_2 = \pi/4$ then argument of $z_1 z_2$ is $7\pi/12$

R : Arg $(z_1 z_2) = Argz_1 + Argz_2$

A. A is true , R is true and R correct explanation of A

B. A is true , R is true and R is not correct explanation of A

C. A is truer , R is false

D. A is false, R is true

Answer: A

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2. (A) : The mod amplitude form of $\dfrac{1+7i}{(2-i)^2}$ is $\sqrt{2}$ c is $\dfrac{3\pi}{4}$

(R) : The mod-amplitude form z = a+ ib is r cis θ where r = |z| , θ is amplitude of z

A. A is true , R is true and R correct explanation of A

B. A is true , R is true and R is not correct explanation of A

C. A is true , R is false

D. A is false, R is true

Answer: A

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3. A : If $2z_1 - 3z_2 + z_3 = 0$ then z_1, z_2, z_3 are collinear points

R : If a , b, c $\in R$ such that a + b+ c = 0 and $az_1 + bz_2 + cz_3 = 0 then z_1, z_2, z_3$ are collinear

A. A is true , R is true and R correct explanation of A

B. A is true , R is true and R is not correct explanation of A

C. A is true , R is false

D. A is false, R is true

Answer: A

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4. A : If |z+1| -|z-1| =3/2 then the least value of |z| is 3/4

R : If z_1, z_2 are two complex numbers then $|z_1 - z_2| \geq ||z_1| - |z_2||$

A. A is true , R is true and R correct explanation of A

B. A is true , R is true and R is not correct explanation of A

C. A is true , R is false

D. A is false, R is true

Answer: B

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5. A : Area of triangle formed by $1 + i, \; -1 + I, 2i$ is '1' square unit

R : Area of triangle formed by the complex number z , iz, ,z + iz is $\frac{1}{2}|z|^2$

A. A is true , R is true and R correct explanation of A

B. A is true , R is true and R is not correct explanation of A

C. A is true , R is false

D. A is false, R is true

Answer: A

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