MATHS

BOOKS - RD SHARMA MATHS (ENGLISH)

COMPLEX NUMBERS

Others

1. If the imaginary part of $\frac{2z+1}{iz+1}$ is -2, then show that the locus of the point respresenting z in the argand plane is a straight line.

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2. If $\left|z^2-1\right| = |z|^2+1$, then show that z lies on the imaginary axis.

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3. Solve the equation $|z+1| = z + 2(1+i)$.

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4. Solve the equation $z^2 = \bar{z}$

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5. Find a complex number z satisfying the equation $z + \sqrt{2}|z+1| + i = 0$.

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6. Show that $\left|\frac{z-2}{z-3}\right| = 2$ represents a circle, find its centre and radius.

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7. If $z = x + iy,$ then show that $z\bar{z} + 2(z + \bar{z}) + a = 0$, where $a \in R,$ represents a circle.

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8. If the real part of $\frac{z+2}{z-1}$ is $4,$ then show that the locus of he point representing z in the complex plane is a circle.

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9. For any complex number z prove that $|Re(z)| + |Im(z)| \leq \sqrt{2}|z|$

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10. Find the square roots of the following: i

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11. If $\left(\frac{1+i}{1-i}\right)^2 = x + iy$, find $x + y$.

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12. If for complex numbers z_1 and z_2 and $|1 - \overline{z_1} z_2|^2 - |z_1 - z_2|^2 = k\left(1 - |z_1|^2\right)\left(1 - |z_2|^2\right)$ then k is equal to:

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13. If $arg(z-1) = arg(z+2i)$, then find $(x-1) : y$, where $z = x + iy$

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14. Solve the equation $|z| = z + 1 + 2i$.

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15. If z 1 and z 2 are two non zero complex numbers such that |z 1 +z 2 |=|z 1 |+|z 2 | then arg z 1 -arg z 2 is equal to

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16. If for complex numbers z_1 and z_2 ,$arg(z_1) - arg(z_2) = 0$, then show that $|z_1 - z_2| = ||z_1| - |z_2||$

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17. What is the smallest positive integer n for which $(1+i)^{2n} = (1-i)^{2n}$?

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18. If $(1+i)z = (1-i)\bar{z}$, then show that $z = -i\bar{z}$.

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19. Write the conjugate of $\frac{2-i}{(1-2i)^2}$.

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20. If $z(\neq -1)$ is a complex number such that $\frac{z-1}{z+1}$ is purely imaginary, then $|z|$ is equal to

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21. If z and w are two complex number such that $|zw|=1$ and $arg(z)-arg(w)=\frac{\pi}{2}$, then show that $\bar{z}w=-i$.

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22. The value of $(1+i)^4+(1-i)^4$ is

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23. 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 radius1 (c)y-axis (d) none of these

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24. If z = x + iy lies in III quadrant, then $\frac{\bar{z}}{z}$ also lies in III quadrant If:

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25. If $a = \cos\theta + i\sin\theta$, find the value of $\frac{1+a}{1-a}$.

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26. Let $z_1 = r_1(\cos\theta_1 + i\sin\theta_1) and z_2 = r_2(\cos\theta_2 + i\sin\theta_2)$ be two complex numbers. Then prove that

$|z_1 + z_2|^2 = r12 + r22 + 2r_1 r_2 \cos(\theta_1 - \theta_2)$ or

$|z_1 + z_2|^2 = |z_1|^2 + |z_2|^2 + 2|z_1||z_2| \_ \cos(\theta_1 - \theta_2)$

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27. For a positive integer n , find the value of $(1 - i)^n \left(1 - \frac{1}{i}\right)^n$.

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28. If

$(1 + i)(1 + 2i)(1 + 3i) \ldots\ldots . (1 + ni) = a + ib, then 2 \times 5 \times 10 \ldots . \left(1 + n\right.$

is equal to $\sqrt{a^2 + b^2}$ (b) $\sqrt{a^2 - b^2}$ (c) $a^2 + b^2$ (d) $a^2 - b^2$ (e) $a + b$

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29. Perform the indicated operation and find the result in the form $a + ib$.

(i) $\frac{2 - \sqrt{-25}}{1 - \sqrt{-16}}$ (ii) $\frac{3 - \sqrt{-16}}{1 - \sqrt{-9}}$

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30. Let $z_1 = 2 - i, z_2 = -2 + i$. Find (i) Re $\left(\frac{z_1 z_2}{\bar{z}_1}\right)$ (ii) Im $\left(\frac{1}{z_1 \bar{z}_1}\right)$

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31. Which of the following is correct for any tow complex numbers $z_1 and z_2$? (a) $|z_1 z_2| = |z_1||z_2|$ (b) $arg(z_1 z_2) = arg(z_1) arg(z_2)$ (c) $|z_1 + z_2| = |z_1| + |z_2|$ (d) $|z_1 + z_2| \geq |z_1| + |z_2|$

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32. If $z_1 and z_2$ are two complex numbers such that $|z_1| = |z_2| and arg(z_1) + arg(z_2) = \pi$, then show that $z_1, = -(z)_2$.

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33. Evaluate $\sum_{n=1}^{13} \left(i^n + i^{n+1}\right)$, where $n \in N$.

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34. Evaluate $1 + i^2 + i^4 + i^6 + \ldots + i^{2n}$.

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35. Show that: $\left\{i^{19} + \left(\frac{1}{i}\right)^{25}\right\}^2 = -4$ (ii) $\left\{i^{17} - \left(\frac{1}{i}\right)^{34}\right\}^2 = 2i$ (iii) $\left\{i^{18} + \left(\frac{1}{i}\right)^{24}\right\}^3 = 0$ (iv) $i^n + i^{n+1} + i^{n+2} + i^{n+3} = 0$ for all $n \in N$.

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36. If $z_1, z_2 \in C$, then say which are true and false –

$|z_1 + z_2|^2 = |z_1|^2 + |z_2|^2 - 2Re(z_1 z_2)$

$|z_1 - z_2|^2 = |z_1|^2 - |z_2|^2 - 2Re(z_1 z_2)$

$|z_1 + z_2|^2 + |z_1 - z_2|^2 = 2\left(|z_1|^2 + |z_2|^2\right)$

$|az_1 - bz_2|^2 + |bz_1 + az_2|^2 = \left(a^2 + b^2\right)\left(|z_1|^2 + |z_2|^2\right)$, where $a, b \in R$.

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37. Prove that the following complex number is purely real: (i) $\left(\frac{2+3i}{3+4i}\right)\left(\frac{2-3i}{3-4i}\right)$

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38. Show that $1+i^{10}+i^{20}+i^{30}$ is a real number.

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39. Find the values of following expression:$1+i^2+i^4+i^6+i^8+i^{.20}$

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40. If $(a+ib)(c+id)(e+\quad \text{if} \quad)(g+ih)=A+iB$ prove that $\left(a^2+b^2\right)\left(c^2+d^2\right)\left(e^2+f^2\right)\left(g^2+h^2\right)=A^2+B^2$

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41. If z_1, z_2 are complex number such that $\frac{2z_1}{3z_2}$ is purely imaginary number, then find $\left|\frac{z_1 - z_2}{z_1 + z_2}\right|$.

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42. If $x = -5 + 2\sqrt{-4}$, find the value of $x^4 + 9x^3 + 35x^2 - x + 4$.

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43. If z is a complex number such that $|z| = 1$, prove that $\frac{z-1}{z+1}$ is purely imaginary, what will by your conclusion if $z = 1$?

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44. If $z = x + iy$ and $w = \frac{1 - iz}{z - i}$, show that $|w| = 1z$ is purely real.

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45. If $z = 2 - 3i$ show that $z^2 - 4z + 13 = 0$ and hence find the value of $4z^3 - 3z^2 + 169$.

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46. If $|z_1| = |z_2| = \ldots\ldots = |z_n| = 1$, prove that $|z_1 + z_2 + z_3 + \ + z_n| = \frac{1}{z_1} + \frac{1}{z_2} + \frac{1}{z_3} + \ + \frac{1}{z_n}$

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47. Find the non-zero complex numbers z satisfying $\bar{z} = iz^2$.

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48. Show that if $iz^3 + z^2 - z + i = 0$, then $|z| = 1$

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49. Solve the equation $z^2 + |z| = 0$, where z is a complex number.

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50. If $z_1, z_2 and z_3, z_4$ are two pairs of conjugate complex numbers, find the `a rg((z1)/(z4))+a rg((z2)/(z3)) =0

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51. If $z_r = \cos\left(\frac{\pi}{3^r}\right) + i\sin\left(\frac{\pi}{3^r}\right), r = 1, 2, 3, ,$ prove that $z_1 z_2 z_3 z_\infty = i.$

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52. If x_n=cos$\frac{\pi}{2^n}$+isin$\frac{\pi}{2^n}$, prove that $x_1 x_2 x_3 x_\infty = -1.$

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53. Find the square root of the following: $5 + 12i$

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54. Find the square roots of $-15 - 8i$.

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55. Find the number of solutions of $z^2 + |z|^2 = 0$.

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56. If $\left(\frac{a^2+1}{2a-i}\right)^2 = x + iy$, find the value of $x^2 + y^2$.

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57. Let $z_1 and z_2$ be two complex numbers such that $(z)_1 + i(z)_2 = 0$ and $arg(z_1 z_2) = \pi$. Then, find $arg(z_1)$.

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58. If $|z - 5i| = |z + 5i|$, then the locus of z.

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59. If $z_1 and z_2$ both satisfy $z + \bar{z}r = 2|z - 1|$ and $arg(z_1 - z_2) = \frac{\pi}{4}$, then find I m(z_1+z_2) .

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60. Show that the complex number z, satisfying the condition arg `((z -1)/(z + 1))=(pi)/(4) lies on a circle.

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61. If $z = \frac{1+7i}{(2-i)^2}$, then find |z|?

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62. The value of $\frac{i^5+i^6+i^7+i^8+i^9}{1+i}$ is

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63. Write the least positive integral value of n for which $\left(\frac{1+i}{1-i}\right)^n$ is real.

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

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65. 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

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66. What is the locus of z, if amplitude of $(z - 2 - 3i)$ is $\frac{\pi}{4}$?

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67. Write the sum of the series $i + i^2 + i^3 + \ldots\ldots$ upto 1000 terms.

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68. The sum and product of two complex numbers are real if and only if they are conjugate of each other.

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69. If $\frac{(a+i)^2}{(2a-i)} = p + iq$, show that: $p^2 + q^2 = \frac{(a^2+1)^2}{(4a^2+1)}$.

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70. Write the value of $arg(z) + arg(\bar{z})$.

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71. Express the following complex numbers in the standard form. Also find their conjugate: $(i)\ \frac{1-i}{1+i}$ (ii) $\frac{(1-i)^2}{3-i}$

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72. Find the conjugate of $\frac{1}{3+4i}$.

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73. If under root of (a+i b)/(c+i d)=x+i y , Prove (a^2+b^2)/(c^2+d^2)= (x^2+y^2)^2

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74. Find real values of x and y for which the complex numbers $-3+ix^2y$ and x^2+y+4i are conjugate of each other.

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75. Find the real values of x and y for which $(1+i)y^2+(6+i)=(2+i)x$

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76. Find the real values of $xandy$, if (3x-7)+2i y=-5y+(5+x)i`

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77. If $(x+iy)^{1/3} = a+ib, x, y, ab \in R$. Show that $\frac{x}{a}+\frac{y}{b} = 4(a^2-b^2)$ (ii) $\frac{x}{a}-\frac{y}{b} = 2(a^2+b^2)$

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78. If $a+ib = \frac{c+i}{c-i}$, where c is real, prove that: $a^2+b^2 = 1$ and $\frac{b}{a} = \frac{2c}{c^2-1}$.

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79. Evaluate the following: i^{135}

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80. Evaluate the following: i^{19}

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81. Evaluate the following: i^{-999}

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82. Evaluate the following: $\left(-\sqrt{-1}\right)^{4n+3}, n \in \mathbb{N}$

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83. Evaluate the following: i^{457}

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84. Evaluate the following: i^{528}

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85. Evaluate the following: $\frac{1}{i^{58}}$

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86. Evaluate the following: $\left(i^{41}+\frac{1}{i^{257}}\right)^{9}$

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87. Evaluate the following: $\left(i^{77}+i^{70}+i^{87}+i^{414}\right)^{3}$

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88. Evaluate the following: $i^{30}+i^{40}+i^{60}$

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89. Evaluate the following: $i^{49}+i^{68}+i^{89}+i^{110}$

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90. Compute the following: $\sqrt{-144}$

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91. Compute the following: $\sqrt{-4} \times \sqrt{\frac{-9}{4}}$

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92. Compute the following: $\sqrt{-25} + 3\sqrt{-4} + 2\sqrt{-9}$

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93. A student writes the formula $\sqrt{ab} = \sqrt{a}\,\sqrt{b}$. Then he substitutes $a = -1$ *and* $b = -1$ *and* finds $1 = -1$. Explain where is he wrong?

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94. Is the following computation correct? If not give the correct computation: $\left[\sqrt{(-2)}\sqrt{(-3)}\right] = \sqrt{(-2)(-3)} = \sqrt{-6}$

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95. If $(a+b) - i(3a+2b) = 5+2i$, find a and b.

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96. Find the multiplicative inverse of $z = 3-2i$.

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97. Express the following in the form $a+ib$: $(-5i)\left(\frac{1}{8}i\right)$

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98. Express the following in the form $a + ib$: $(5i)\left(-\frac{3}{5}i\right)$

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99. Express the following in the form $a + ib$: i^{-39}

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100. Express the following in the form $a + ib$: $(-i)(2i)\left(-\frac{1}{8}i\right)^3$

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101. Express the following in the form $a + ib$: $i^9 + i^{19}$

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102. Express the following in the form $a + ib$: $(1 - i)^4$

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103. Express each of the following in the form $a + ib$: $3(7 + 7i) + i(7 + 7i)$

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104. Express each of the following in the form $a + ib$: $\left(\frac{1}{5} + \frac{2}{5}i\right) - \left(4 + \frac{5}{2}i\right)$

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105. Express each of the following in the form $a + ib$: $(1 - i) - (-1 + 6i)$

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106. Express each of the following in the form $a+ib$: $\left\{\left(\frac{1}{3}+\frac{7}{3}i\right)+\left(4+\frac{1}{3}i\right)\right\}-\left(-\frac{4}{3}+i\right)$

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107. Express each of the following in the form $a+ib$: $\left(\frac{1}{3}+3i\right)^3$

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108. Express each of the following in the form $a+ib$: $(5-3i)^3$

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109. Express each of the following in the form $a+ib$: $\left(-2-\frac{1}{3}i\right)^3$

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110. Express each of the following in the form $a + ib$: $\left(-\sqrt{3} + \sqrt{-2}\right)\left(2\sqrt{3} - i\right)$

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111. Express the following in the standard form $a + ib$: $\frac{1}{3 - 4i}$

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112. Express the following in the standard form $a + ib$: $\frac{(3 - 2i)(2 + 3i)}{(1 + 2i)(2 - i)}$

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113. Express the following in the standard form $a + ib$: $\frac{5 + 4i}{4 + 5i}$

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114. Express the following in the standard form $a+ib$: $\frac{1}{-2+\sqrt{-3}}$

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115. Express the following in the standard form $a+ib$: $\frac{\left(3+i\sqrt{5}\right)\left(3-i\sqrt{5}\right)}{\left(\sqrt{3}+\sqrt{2}i\right)-\left(\sqrt{3}-i\sqrt{2}\right)}$.

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116. Express the following in the standard form $a+ib$: $\frac{(1+i)^2}{3-i}$

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117. Express the following in the standard form $a+ib$: $\left(\frac{1}{1-2i}+\frac{3}{1+i}\right)\left(\frac{3+4i}{2-4i}\right)$

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118. Express the following in the standard form $a+ib$: $\frac{1}{1-\cos\theta+2i\sin\theta}$

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119. Express $(1-2i)^{-3}$ in the standard form $a+ib$.

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120. Perform the indicated operation and find the result in the form $a+ib$: $\frac{2-\sqrt{-25}}{1-\sqrt{-16}}$

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121. Perform the indicated operation and find the result in the form $a+ib$: $\frac{3-\sqrt{-16}}{1-\sqrt{-9}}$

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122. Multiply $3 - 2i$ by its conjugate.

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123. Find the real numbers $x \; and \; y,$ if $(x - iy)(3 + 5i)$ is the conjugate of $-6 - 24i$.

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124. Find the multiplicative inverse of the complex number: $3 + 2i$

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125. Find the multiplicative inverse of the following complex number: $\left(2 + \sqrt{3}i\right)^2$

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126. If $a+ib=\frac{(x+i)^2}{2x^2+1}$, prove that $a^2+b^2=\frac{\left(x^2+1\right)^2}{\left(2x^2+1\right)^2}$

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127. If $x+iy=\sqrt{\frac{a+ib}{c+id}}$ prove that $\left(x^2+y^2\right)^2=\frac{a^2+b^2}{c^2+d^2}$

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128. Find the least positive value of n if $\left(\frac{1+i}{1-i}\right)^n=1$.

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129. Find real θ such that $\frac{3+2i\sin\theta}{1-2i\sin\theta}$ is purely real.

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130. If $(1+i)(1+2i)(1+3i)(1+ni) = (x+iy)$, Show that $2.5.10.... .\left(1+n^2\right) = x^2+y^2.$

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131. Find the value of $x^3+7x^2-x+1,\ when\ x=1+2i.$

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132. Prove that: $x^4+4=(x+1+i)(x+1-i)(x-1+i)(x-1-i)$

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133. Show that a real value of x will satisfy the equation $\frac{1-ix}{1+ix} = a-ib$ if $a^2+b^2=1$, when a , b are real.

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134. If α an d β are different complex numbers with $|\beta| = 1$, then find $\left|\frac{\beta - \alpha}{1 - \overline{\alpha}\beta}\right|$.

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135. Find non zero integral solutions of $|1 - i|^x = 2^x$.

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136. Express the following complex numbers in the standard form $a + ib$: $(1 + i)(1 + 2i)$

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137. Express the following complex numbers in the standard form $a + ib$: $\frac{1}{(2 + i)^3}$

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138. Express the following complex numbers in the standard form $a+ib$: $\frac{(2+i)^3}{2+3i}$

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139. Express the following complex numbers in the standard form $a+ib$: $(1+2i)^{-3}$

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140. Express the following complex numbers in the standard form $a+ib$: $\left(\frac{1}{1-4i}-\frac{2}{1+i}\right)\left(\frac{3-4i}{5+i}\right)$

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141. Express the following complex numbers in the standard form $a+ib$: $\frac{3+2i}{-2+i}$

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142. Express the following complex numbers in the standard form $a+ib$: $\frac{1-i}{1+i}$

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143. Express the following complex numbers in the standard form $a+ib$: $\frac{(1+i)\left(1+\sqrt{3}i\right)}{1-i}$

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144. Express the following complex numbers in the standard form $a+ib$: $\frac{3-4i}{(4-2i)(1+i)}$

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145. Express the following complex numbers in the standard form $a + ib$: $\frac{5 + \sqrt{2}i}{1 - \sqrt{2}i}$

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146. Find the real values of x *and* y, if $: (x + iy)(2 - 3i) = 4 + i$

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147. Find the real values of x *and* y, if $: \frac{(1 + i)x - 2i}{3 + i} + \frac{(2 - 3i)y + i}{3 - i} = i$

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148. Find the real values of $x \text{ and } y, \quad \text{if} \quad : (3x - 2iy)(2 + i)^2 = 10(1 + i)$

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149. Find the real values of $x \text{ and } y, \quad \text{if} \quad : (1 + i)(x + iy) = 2 - 5i$

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150. Find the conjugates of the following complex number: $4 - 5i$

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151. Find the conjugates of the following complex number: $\frac{1}{3 + 5i}$

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152. Find the conjugates of the following complex number: $\frac{1}{1+i}$

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153. Find the conjugates of the following complex number: $\frac{(1+i)(2+i)}{3+i}$

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154. Find the conjugates of the following complex number: $\frac{(3-i)^2}{2+i}$

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155. Find the conjugates of the following complex number: $\frac{(3-2i)(2+3i)}{(1+2i)(2-i)}$

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156. Find the multiplicative of the following complex number: $1 - i$

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157. Find the multiplicative of the following complex number: $4 - 3i$

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158. Find the multiplicative of the following complex number: $\left(1 + i\sqrt{3}\right)^2$

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159. Find the multiplicative of the following complex number: $\sqrt{5} + 3i$

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160. If $z_1 = 2 - i,\ z_2 = 1 + i,$ find $\left|\frac{z_1 + z_2 + 1}{z_1 - z_2 + i}\right|.$

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161. If $z_1 = 2 - i,\ z_2 = -2 + i,$ find : $Re\left(\frac{z_1 z_2}{\overline{z_1}}\right)$

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162. If $z_1 = 2 - i,\ z_2 = -2 + i,$ find : $Im\left(\frac{1}{z_1 \overline{z_2}}\right)$.

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163. Find the modulus of $\frac{1+i}{1-i} - \frac{1-i}{1+i}$

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164. If $x + iy = \frac{a+ib}{a-ib}$ prove that $x^2 + y^2 = 1$

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165. Write the least positive integral value of n for which $\left(\frac{1+i}{1-i}\right)^n$ is real.

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166. Find the real values of θ for which the complex number $\frac{1+i\cos\theta}{1-2i\cos\theta}$ is purely real.

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167. Find the smallest positive integer value of n for which $\frac{(1+i)^n}{(1-i)^{n-2}}$ is a real number.

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168. If $\left(\frac{1+i}{1-i}\right)^3-\left(\frac{1-i}{1+i}\right)^3=x+iy,\ f\in d\,(x,y)$

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169. If $\left(\frac{1-i}{1+i}\right)^{100} = a + ib$, find (a, b)

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170. Evaluate the following: $2x^3 + 2x^2 - 7x + 72,\ when\ x = \frac{3-5i}{2}$

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171. Evaluate $x^4 - 4x^3 + 4x^2 + 8x + 44$, when $x = 3 + 2i$

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172. Evaluate the following:

$x^4 + 4x^3 + 6x^2 + 4x + 9,\ when\ x = -1 + i\sqrt{2}$

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173. Evaluate the following: $x^6 + x^4 + x^2 + 1,\ when\ x = \frac{1+i}{\sqrt{2}}$

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174. Evaluate the following:

$2x^4 + 5x^3 + 7x^2 - x + 41,\ when\ x = -2 - \sqrt{3}i$

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175. If z_1 is a complex number other than -1 such that $|z_1| = 1\ and\ z_2 = \frac{z_1 - 1}{z_1 + 1}$, then show that the real parts of z_2 is zero.

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176. Solve the system of equations $Re(z^2) = 0,\ |z| = 2$

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177. If $|z+1| = z + 2(1+i)$, find z.

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

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179. Find the square roots of the following:$8i$

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180. Find the square root of the following complex number: $1 + 4\sqrt{-3}$

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181. Find the square root of the following complex number: $-7 - 24i$

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182. Find square root of $8 - 15i$

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183. Find the square root of the following complex number: $1 - i$

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184. Find the square root of the following complex number: $-11 - 60\sqrt{-1}$

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185. Find the square root of the following complex number: $-i$

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186. Find the modulus and argument of each of the following complex number: $1 + i\sqrt{3}$

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187. Find the modulus and argument of each of the following complex number: $-\sqrt{3} - i$

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188. Find the modulus and argument of each of the following complex number: $-2 - 2i\sqrt{3}$

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189. Find the modulus and argument of each of the following complex number: $2\sqrt{3} - 2i$

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190. Find the modulus and argument of the following complex number: $\frac{1+i}{1-i}$

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191. Find the modulus and argument of the following complex number: $\frac{1}{1+i}$

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192. Write the following complex numbers in the polar form: $-3\sqrt{2} + 3\sqrt{2}i$

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193. Write the following complex numbers in the polar form: $-1-i$

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194. Write the following complex numbers in the polar form: $1+i$

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195. Write the following complex numbers in the polar form: $1-i$

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196. Find the modulus and principal argument of $(1+i)$ and hence express it in the polar form.

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197. Find the modulus and principal argument of $-2i$

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198. Find the modulus and principal argument of -4.

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199. Express the following complex number in the polar form: $\frac{1+i}{1-i}$

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200. Express the following complex number in the polar form: $\frac{2+6\sqrt{3}i}{5+\sqrt{3}i}$

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201. Put the complex number $\frac{1+7i}{(2-i)^2}$ in the form $r(\cos\theta + i\sin\theta)$, where r is a positive real number and $-\pi < \theta \leq \pi$.

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202. Find the modulus and argument of the following complex number $\frac{1+2i}{1-3i}$

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203. Find the modulus and argument of the following complex number and convert them in polar form: $\frac{1+3i}{1-2i}$

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204. Find the modulus and argument of the following complex number and convert them in polar form: $\frac{i-1}{\cos\left(\frac{\pi}{3}\right)+i\sin\left(\frac{\pi}{3}\right)}$

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205. For any two complex number z 1 and z 2 prove that Re(z 1 z 2)=Rez 1 Rez 2 −Imz 1 Imz 1

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206. For any two complex number $z_1 and\, z_2$ prove that: $|z_1 - z_2| \leq |z_1| + |z_2|$

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207. For any two complex number $z_1 and\, z_2$ prove that: $|z_1 + z_2| \geq |z_1| - |z_2|$

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208. For any two complex number $z_1 and\, z_2$ prove that: $|z_1 - z_2| \geq |z_1| - |z_2|$

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209. Find the modulus and argument of the following complex number and hence express them in the polar form: $1 + i$

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210. Find the modulus and argument of the following complex number and hence express them in the polar form: $1 - i$

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211. Find the modulus and argument of the following complex number and hence express them in the polar form: $\frac{1}{1+i}$

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212. Find the modulus and argument of the following complex number and hence express them in the polar form: $\sin 120^\circ - i \cos 120^\circ$

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213. Find the modulus and argument of the following complex number and hence express them in the polar form: $\sqrt{3} + i$

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214. Find the modulus and argument of the following complex number and hence express them in the polar form: $\frac{1-i}{1+i}$

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215. Find the modulus and argument of the following complex number and hence express them in the polar form: $\frac{1+2i}{1-3i}$

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216. Find the modulus and argument of the following complex number and hence express them in the polar form: $\frac{-16}{1+i\sqrt{3}}$

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217. Write $\left(i^{25}\right)^3$ in polar form.

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218. Write the values of the square root of i.

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219. Write the values of the square root of $-i$.

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220. If $x+iy=\sqrt{\frac{a+ib}{c+id}}$, then write the value of $\left(x^2+y^2\right)^2$.

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221. If $\pi < \theta < 2\pi$ and z=1+cosθ+$i$sinθ , then write the value of $|z|$

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222. If n is any positive integer, write the value of $\frac{i^{4n+1}-i^{4n-1}}{2}$.

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223. Write the value of $\frac{i^{592}+i^{590}+i^{588}+i^{586}+i^{584}}{i^{582}+i^{580}+i^{578}+i^{576}+i^{574}}$.

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224. Write $1 - i$ in polar form.

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225. Write $1 + i\sqrt{3}$ in polar form.

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226. Write the argument of i.

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227. Find the principal argument of $\left(1 + i\sqrt{3}\right)^2$.

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228. Find z, if $|z| = 4$ and $arg(z) = \frac{5\pi}{6}$ where z represents a complex number..

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229. Write the value of $\sqrt{-25} \times \sqrt{-9}$.

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230. Write the value of $arg(z) + arg(\bar{z})$.

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231. If $|z + 4| \leq 3$ then find the greatest and least values of $|z + 1|$.

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232. For any two complex numbers $z_1 \; and \; z_2$ and any two real numbers $a,\ b$ find the value of $|az_1 - bz_2|^2 + |az_2 + bz_1|^2$.

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233. If $n \in \mathbb{N}$, then find the value of $i^n + i^{n+1} + i^{n+2} + i^{n+3}$.

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234. Find the real value of a for which $3i^3 - 2ai^2 + (1-a)i + 5$ is real.

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235. If $|z| = 2$ and $\arg(z) = \frac{\pi}{4}$, find z.

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236. Write the argument of $\left(1+i\sqrt{3}\right)(1+i)(\cos\theta+i\sin\theta)$.

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237. The value of $(1+i)\left(1+i^2\right)\left(1+i^3\right)\left(1+i^4\right)$ is a. 2 b. 0 c. 1 d. i

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238. If $\frac{3+2i\sin\theta}{1-2i\sin\theta}$ is a real number and $0<\theta<2\pi$, then θ is $a.\ \pi\ b.\ \frac{\pi}{2}\ c.\ \frac{\pi}{3}\ d.\ \frac{\pi}{6}$

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239. If $\sqrt{a+ib}=x+iy$, then possible value of $\sqrt{a-ib}$ is a. x^2+y^2 b. $\sqrt{x^2+y^2}$ c. $x+iy$ d. $x-iy$ e. $\sqrt{x^2-y^2}$

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240. If $z = \cos\left(\frac{\pi}{4}\right) + i\sin\left(\frac{\pi}{6}\right)$, then a. $|z| = 1, arg(z) = \frac{\pi}{4}$ b. $|z| = 1, arg(z) = \frac{\pi}{6}$ c. $|z| = \frac{\sqrt{3}}{2}, arg(z) = \frac{5\pi}{24}$ d. $|z| = \frac{\sqrt{3}}{2}, arg(z) = \tan^{-1}\left(\frac{1}{\sqrt{2}}\right)$

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241. The polar form of $\left(i^{25}\right)^3$ is a. $\cos\left(\frac{\pi}{2}\right) + i\sin\left(\frac{\pi}{2}\right)$ b. $\cos\pi + i\sin\pi$ c. $\cos\pi - i\sin\pi$ d. $\cos\left(\frac{\pi}{2}\right) - i\sin\left(\frac{\pi}{2}\right)$

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242. If $i^2 = -1$, then the sum $i + i^2 + i^3 + \ldots$ upto 1000 terms is equal to a. 1 b. -1 c. i d. 0

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243. If $z = \frac{-2}{1 + i\sqrt{3}}$, then the value of $\arg(z)$ is a. π b. $\frac{\pi}{4}$ c. $\frac{\pi}{3}$ d. $\frac{2\pi}{3}$

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244. If $a = \cos\theta + i\sin\theta$, then $\frac{1+a}{1-a}$ is: $(a).\ \cot\left(\frac{\theta}{2}\right)$ $(b).\ \cot\theta$ $(c).\ i\cot\left(\frac{\theta}{2}\right)$ $(d).\ i\tan\left(\frac{\theta}{2}\right)$

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245. If $(1+i)(1+2i)(1+3i)...(1+ni) = a+ib$, then the value of; $2.\ 5.\ 10.\ 17...\left(1+n^2\right)$ will be $(a).\ a-ib$ $(b).\ a^2-b^2$ $(c).\ a^2+b^2$ $(d).$ none of these

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246. If $\frac{\left(a^2+1\right)^2}{2a-i} = x+iy$, then x^2+y^2 is equal to a. $\frac{\left(a^2+1\right)^4}{4a^2+1}$ b. $\frac{(a+1)^2}{4a^2+1}$ c. $\frac{\left(a^2-1\right)^2}{\left(4a^2-1\right)^2}$ d. none of these

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247. The principal value of the amplitude of $(1+i)$ is

A. π

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

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

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

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248. The least positive integer n such that $\left(\frac{2i}{1+i}\right)^n$ is a positive integer

is a. 16 b. 8 c. 4 d. 2

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249. If z is a non zero complex, number then $\left|\frac{|\bar{z}|^2}{z\bar{z}}\right|$ is equal to

(a). $\left|\frac{\bar{z}}{z}\right|$

(b). $|z|$

(c). $|\bar{z}|$

(d). none of these

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250. If $a = 1 + i,$ then a^2 equals

A. $1 - i$

B. $2i$

C. $(1 + i)(1 - i)$

D. $(i - 1)$

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251. If $(x + iy)^{1/3} = a + ib,$ $then$ $\frac{x}{a} + \frac{y}{b}$ is

a. 0 b. 1 c. -1 d. none of these

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252. $\left(\sqrt{-2}\right)\left(\sqrt{-3}\right)$ is equal to

A. $\sqrt{6}$

B. $-\sqrt{6}$

C. $i\sqrt{6}$

D. none of these

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253. The argument of $\frac{1-i\sqrt{3}}{1+i\sqrt{3}}$ is a. 60° b. 120° c. 210° d. 240°

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254. If $z=\left(\frac{1+i}{1-i}\right)$, then z^4 equals to

A. a)1

B. b)-1

C. c)0

D. d)non of these

Answer: null

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255. If $z = \frac{1+2i}{1-(1-i)^2}$, then $arg(z)$ equals a. 0 b. $\frac{\pi}{2}$ c. π d. non of these

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256. If $z = \frac{1}{(2+3i)^2}$, then $|z|$ is

$(a).\ \frac{1}{13}\ (b).\ \frac{1}{5}\ (c).\ \frac{1}{12}\ (d).$ none of these

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257. If $z = \frac{1}{(1-i)(2+3i)}$, then $|z|$ is $(a).\ 1\ (b).\ \frac{1}{\sqrt{26}}\ (c).\ \frac{5}{\sqrt{26}}\ (d).$ none of these

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258. If $z = 1 - \cos\theta + i\sin\theta$, *then* $|z|$ is equal to a. $2\sin\left(\frac{\theta}{2}\right)$ b. $2\cos\left(\frac{\theta}{2}\right)$ c. $2\left|\sin\left(\frac{\theta}{2}\right)\right|$ d. $2\left|\cos\left(\frac{\theta}{2}\right)\right|$

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259. If $x + iy = (1+i)(1+2i)(1+3i)$, *then* $x^2 + y^2$ is: $(a).\ 0\ (b).\ 1$ $(c).\ 100\ (d).$ none of these

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260. If $z = \frac{1}{1 - \cos\theta - i\sin\theta}$, then $Re(z)$ is a. 0 b. $\frac{1}{2}$ c. $\cot\left(\frac{\theta}{2}\right)$ d. $\frac{1}{2}\cot\left(\frac{\theta}{2}\right)$

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261. If $x + iy = \frac{3 + 5i}{7 - 6i}$, then y is

A. $\frac{9}{85}$

B. $-\frac{9}{85}$

C. $\frac{53}{85}$

D. none of these

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262. The amplitude of $\frac{1}{i}$ is equal to

a. 0 b. $\frac{\pi}{2}$ c. $-\frac{\pi}{2}$ d. π

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263. The argument of $\frac{1 - i}{1 + i}$ is

a. $-\frac{\pi}{2}$ b. $\frac{\pi}{2}$ c. $\frac{3\pi}{2}$ d. $\frac{5\pi}{2}$

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264. The amplitude of $\frac{1+i\sqrt{3}}{\sqrt{3}+i}$ is a. $\frac{\pi}{3}$ b. $-\frac{\pi}{3}$ c. $\frac{\pi}{6}$ d. $-\frac{\pi}{6}$

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265. $\frac{1+2i+3i^2}{1-2i+3i^2}$ equals a. i b. -1 c. $-i$ d. 4

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266. The value of $\frac{i^{592}+i^{590}+i^{588}+i^{586}+i^{584}}{i^{582}+i^{580}+i^{578}+i^{576}+i^{574}}-1$ is a. -1 b. -2 c. -3 d. -4

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267. A real value of x satisfies the equation $\frac{3-4ix}{3+4ix}=a-ib(a,\ b\in\mathbb{R}),\quad$ if $\quad a^2+b^2=$ a. 1 b. -1 c. 2 d. -2

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268. The complex number which satisfies the condition $\left|\frac{i+z}{i-z}\right|=1$ lies on a. circle $x^2+y^2=1$ b. the x-axis c. the y-axis d. the line $x+y=1$

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269. If z is a complex number, then a. $|z|^2>\left|z^2\right|$ b. $|z|^2=\left|z^2\right|$ c. $|z|^2<\left|z^2\right|$ d. $|z|^2\geq\left|z^2\right|$

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