

Answer Keys and Solutions

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| ANSWER KEY | | | | | | | | |
| 1. (4.00) 9. (3) nathongo | 2. (1) 10. (3) athongo | 3. (3) /// mathongo | 4. (1) ///. mathongo | 5. (2) /// mathongo | 6. (3) /// mathongo | 7. (3) ///. mathongo | 8. (1) ///. mathongo | |
| , | | | | | | | | |
| 1. (4.00) mathographi | n = 1 mathongo | | | | | | | |
| $\int 1+i$ 1+ | -i n | | | | | | | |
| $\Rightarrow \left(\frac{1}{1-i} \times \frac{1}{1+i}\right)^2$ | $\binom{i}{i} = 1$ $mathongo$ $= 1$ | | | | | | | |
| | | | | | | | | |
| $\Rightarrow \left(\frac{1^2 + i^2 + 2i}{1 - i^2}\right)$ |) = 1 ///. mathongo | | | | | | | |
| $ ightarrow \left(rac{2i}{2} ight) \ = \ ightarrow i^n = 1$ | 1 | | | | | | | |
| | n integer multiple of | 4.//. mathongo | | | | | | |
| | est positive integer va | | | | | | | |
| 2. (1) We have z = | $=rac{3+2i\cos	heta}{1-3i\cos	heta},	heta\in\left(0,rac{\pi}{2} ight)$ | | | | | | | |
| $\Rightarrow \mathbf{z} = \frac{3+2i\mathrm{co}}{1-2i\mathrm{co}}$ | $\frac{1-3i\cos\theta}{1-3i\cos\theta}$, $\frac{1+3i\cos\theta}{1-3i\cos\theta}$ | | | | | | | |
| $\Rightarrow \mathbf{z} = \frac{\overset{1-3i \text{ co}}{(3+2i)}}{\overset{1}{=}}$ | $\frac{3+2i\cos\theta}{1-3i\cos\theta}, \theta \in \left(0, \frac{\pi}{2}\right)$ $\frac{\cos\theta}{\cos\theta} \times \frac{1+3i\cos\theta}{1+3i\cos\theta}$ $\frac{1+3i\cos\theta}{\cos\theta} \times \frac{1+3i\cos\theta}{1+9\cos^2\theta}$ $\frac{1+9\cos^2\theta}{\cos^2\theta+8i\cos\theta}$ $\frac{1+9\cos^2\theta}{\cos^2\theta+8i\cos\theta}$ | | | | | | | |
| \Rightarrow z = $\frac{\left(3-666\right)}{1}$ | $\frac{\cos^2\theta + 8i\cos\theta}{1 + 9\cos^2\theta}$ | | | | | | | |
| Now, $Re(z)$ | $= \frac{3 - 6\cos^2\theta}{1 + 9\cos^2\theta} = 0$ $\theta = 0$ | | | | | | | |
| $\Rightarrow 3 - 6\cos^2$ $\Rightarrow \theta = \frac{\pi}{4}$ | $\theta = 0$ | | | | | | | |
| | $\theta + \cos^2 \theta = \sin^2 3 \Big(\cdot$ | $\left(\frac{\pi}{4}\right) + \cos^2\left(\frac{\pi}{4}\right) = 1.$ | | | | | | |
| 3. (3) Let $z = x$ | | 1) | | | | | | |
| //. mailz=25 o | 5 ///. mathongo | | | | | | | |
| $ \overline{z-1} =$ | 9 | | | | | | | |
| $\Rightarrow \frac{(x-25)+}{(x-1)+}$ | $\left = 5 \right $ | | | | | | | |
| | | | | | | | | |
| | 5)+iy =5 (x-1)+iy methongo | | | | | | | |
| $\Rightarrow \sqrt{(x-x)^2}$ | $-\frac{1}{(25)^2+y^2}=5\sqrt{(x-1)^2}$ | $\left(-1 ight)^{2}+y^{2}$ | | | | | | |
| w. mathongo | both sides, we get | | | | | | | |
| On squaring | both sides, we get | | | | | | | |
| $(x-25)^2 + 1$ | $y^2 = 25\Big\{ (x-1)^2 +$ | y^2 mathona | | | | | | |
| | | | | | | | | |
| | $60x + 625 + y^2 = 25$ mathongo | | | | | | | |
| $\Rightarrow 24x^2 +$ | | | | | | | | |
| $y \mapsto h x^2 + $ | $y^2=25$ athongo | | | | | | | |
| | | | | | | | | |
| $\Rightarrow \sqrt{x^2 + mathonage}$ | $y^2 = 5$ $ z = 1$ | $\sqrt{(x^2+y^2)}igg]$ | | | | | | |
| $\Rightarrow z = 5$ | | | | | | | | |
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Answer Keys and Solutions

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| 4. | (1) thongo mathongo If a complex number if purely ima | | | | | | | | |
| | $\Rightarrow \frac{z-\alpha}{z+\alpha} = -\left(\frac{\bar{z}-\alpha}{\bar{z}+\alpha}\right)$ $\Rightarrow z\bar{z} + \alpha z - \alpha\bar{z} - \alpha^2 = -\left(z\bar{z} - \alpha^2\right)$ $\Rightarrow z ^2 = \alpha^2$ | $-lpha z + lpha ar{z} - lpha^2 ig)$ | | | | | | | |
| | $\Rightarrow \alpha^2 = 4$ $\Rightarrow \alpha = \pm 2$ mathongo | | | | | | | | |
| 5. | (2) $\sqrt{x^2 + y^2} - x \le 1$ $\Rightarrow \sqrt{x^2 + y^2} \le x + 1$ though $\Rightarrow x^2 + y^2 \le x^2 + 2x + 1$ $\Rightarrow y^2 \le 2x + 1$ | | | | | | | | |
| 14. | | | | | | | | | |
| 6. | (3) $\frac{(1+i)^{5}(1+\sqrt{3}i)^{2}}{-2i(-\sqrt{3}+i)} = \frac{(\sqrt{2})^{5}(\frac{1}{\sqrt{2}})}{-2i(-\sqrt{3}+i)}$ | $\left(\frac{+\frac{\mathbf{i}}{\sqrt{2}}}{2}\right) \cdot 2^{2} \left(\frac{1}{2} + \frac{\sqrt{3}}{2}\mathbf{i}\right)$ $\left(\frac{\sqrt{3}}{2} - \frac{\mathbf{i}}{2}\right) \text{ thouse}$ | | | | | | | |
| | $\therefore \text{ argument} = \frac{5\pi}{4} + \frac{2\pi}{3} - \frac{\pi}{2} + \frac{2\pi}{3}$ mathongo mathongo $\frac{5\pi}{4}$ | $\frac{\pi}{6} = \frac{19\pi}{12}$ mathongo | | | | | | | |
| 7. | ∴ principal argument is $-\frac{5\pi}{12}$ (3) Taking modulus and squaring of $ 1+i ^2 \cdot 1+2i ^2 \cdot \dots \cdot 1-(1+1) \cdot (1+4) \cdot \dots \cdot (1+n)$ | $+\operatorname{ni} ^2= lpha+\mathrm{i}eta ^2$ | | | | | | | |
| ///. 8. | 2.5.10(1+n | | | | | | | | |
| | Given that $ z_1 = z_2 + z_1 - z_2 $, $ z_1 = z_2 = z_1 - z_2 $ $\therefore z_1 - z_2 = z_1 - z_2 $ | | | | | | | | |
| | Now, $argz_1 = argz_2$ $\Rightarrow \arg\left(\frac{z_1}{z_2}\right) = 0$ mothonoo $\Rightarrow Im\left(\frac{z_1}{z_2}\right) = 0$. | | | | | | | | |
| 9. | (3) thongo mathongo We have, $z^2 = \bar{z}$ | | | | | | | | |
| | Let $z = x + iy$ $z^2 = (x + iy)^2 = x^2 + y^2 + i2xy$ $\bar{z} = x - iy$ (ii) | (i) mathongo | | | | | | | |
| | From (i) and (ii) on equating imaginary parts | | | | | | | | |
| | $\Rightarrow 2xy = -y$ $\Rightarrow y(2x+1) = 0$ $\Rightarrow y = 0 \text{ or } x = -\frac{1}{2}$ | | | | | | | | |
| | on equating real parts $\Rightarrow x^2 - y^2 = x$ Case 1: when $y = 0$ $\Rightarrow x^2 - x = 0$ | | | | | | | | |
| | $\Rightarrow x(x-1) = 0$ $\Rightarrow x = 0 \text{ or } x = 1$ Case 2: when $x = -\frac{1}{2}$ | | | | | | | | |
| | $\Rightarrow \frac{1}{4} - y^2 = -\frac{1}{2}$ $\Rightarrow y^2 = \frac{3}{4}$ | | | | | | | | |
| | $\Rightarrow y = \pm \frac{\sqrt{3}}{2}$ hence there exist 4 solution of z | | | | | | | | |
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|---|-----------------------|--|--|-----------------------|
| 10. (3) $x + i(y + 1) + \sqrt{2} x + iy + 1 = 0$ | | | | |
| $y+1=0 \Rightarrow y=-1$: $ x+iy+1 $ mathongo mathongo mathongo mathongo | is real mathongo ///. | | | |
| so $x + \sqrt{2} x - i + 1 = 0$ $(x + 2)^{2} = 0 \Rightarrow x = -2$ | | | | |
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