Find the four fourth roots of

$-1+i\sqrt{3}$

$-1+i\sqrt{3} = r(\cos\theta + i\sin\theta)$

$r\cos\theta = -1$

$r\sin\theta = \sqrt{3}$

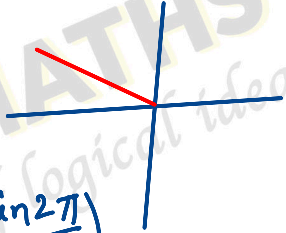
$r^2(\cos^2\theta + \sin^2\theta) = 1+3$

$r^2 = 4$

$r = 2$

$\cos\theta = \frac{-1}{2}$ $\quad$ $\sin\theta = \frac{\sqrt{3}}{2}$

$\theta = \frac{2\pi}{3}$



$$(-1 + i\sqrt{3}) = 2\left(\cos\frac{2\pi}{3} + i\sin\frac{2\pi}{3}\right)$$

$$(-1 + i\sqrt{3})^{1/4} = 2^{1/4}\left\{\cos\frac{2\pi}{3} + i\sin\frac{2\pi}{3}\right]^{1/4}$$

$$= 2^{1/4}\left[\cos\left(2n\pi + \frac{2\pi}{3}\right) + i\sin\left(2n\pi + \frac{2\pi}{3}\right)\right]^{1/4}$$

$n = 0, 1, 2, 3.$

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$$= 2^{1/4}\left[\cos\left(\frac{6n\pi+2\pi}{3}\right)+ i\sin\left(\frac{6n\pi+2\pi}{3}\right)\right]^{1/4}$$

$$= 2^{1/4}\left[\cos\frac{2(3n\pi+\pi)}{3\times 4} + i\sin\frac{2(3n\pi+\pi)}{3\times 4}\right]$$

$$= 2^{1/4}\left[\cos\left(\frac{3n\pi+\pi}{6}\right) + i\sin\left(\frac{3n\pi+\pi}{6}\right)\right]$$

$$n = 0, 1, 2, 3.$$

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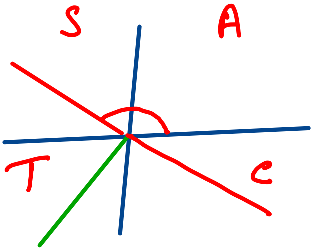
Now roots are

$$2^{1/4}\left(\cos\frac{\pi}{6}+i\sin\frac{\pi}{6}\right),\ 2^{1/4}\left(\cos\frac{2\pi}{3}+i\sin\left(\frac{2\pi}{3}\right)\right),$$

$$2^{1/4}\left(\cos\frac{7\pi}{6}+i\sin\frac{7\pi}{6}\right),\ 2^{1/4}\left(\cos\frac{5\pi}{3}+i\sin\frac{5\pi}{3}\right)$$

$$2^{1/4}\left(\frac{\sqrt{3}}{2}+i\,\frac{1}{2}\right),\ 2^{1/4}\left(\frac{-1}{2}+i\,\frac{\sqrt{3}}{2}\right),$$

$$2^{1/4}\left(\frac{-\sqrt{3}}{2}-i\,\frac{1}{2}\right),\ 2^{1/4}\left(\frac{1}{2}+i\left(\frac{-\sqrt{3}}{2}\right)\right)$$



$$2^{1/4}\left(\frac{\sqrt{3}+i}{2}\right),\quad 2^{1/4}\left(\frac{-1+i\sqrt{3}}{2}\right),$$

$$2^{1/4}\left(\frac{-\sqrt{3}-i}{2}\right),\quad 2^{1/4}\left(\frac{1-i\sqrt{3}}{2}\right)$$ Ans.

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