

18a. To start we know that the modulus of z_0 is

$$\begin{aligned}r_{z_0} &= \sqrt{(2)^2 + (2\sqrt{3})^2} \\&= \sqrt{4 + (4)(3)} \\&= \sqrt{16} \\&= 4\end{aligned}$$

We also know that the θ of z_0 is:

$$\begin{aligned}\theta_{z_0} &= \tan^{-1}\left(\frac{2\sqrt{3}}{2}\right) \\ \theta_{z_0} &= \tan^{-1}(\sqrt{3}) \\ \theta_{z_0} &= \frac{\pi}{3}\end{aligned}$$

Thus we know z_0 will be:

$$\begin{aligned}z_0 &= r(\cos \theta + i \sin \theta) \\ z_0 &= 4\left(\cos\left(\frac{\pi}{3}\right) + i \sin\left(\frac{\pi}{3}\right)\right)\end{aligned}$$

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