

Solve for z in either rectangular or polar form:

$$z^3 = 27$$

$$z^3 + i = 2$$

$$\sqrt{2z} + i = 1$$

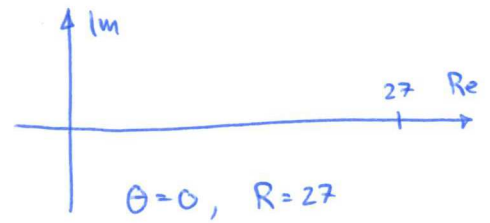
$$z^2 + z + 1 = 0$$

$$3e^{zi} = 2 - i$$

$$\ln z + i = 2 - 4i$$

Solve for z in either rectangular or polar form:

$$z^3 = 27$$



$$z = (27)^{\frac{1}{3}}$$

$$\theta = 0$$

$$= (27e^{i0})^{\frac{1}{3}} = 3e^0 = 3 + 0i$$

$$\theta = 0 + 2\pi$$

$$= (27e^{2\pi i})^{\frac{1}{3}} = 3e^{\frac{2\pi}{3}i} = -1.5 + 2.598i$$

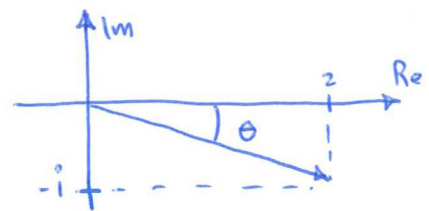
$$\theta = 0 + 4\pi$$

$$= (27e^{4\pi i})^{\frac{1}{3}} = 3e^{\frac{4\pi}{3}i} = -1.5 - 2.598i$$

$$z^3 + i = 2$$

$$z = (2 - i)^{\frac{1}{3}}$$

$$= (\sqrt{5}e^{0.4636i})^{\frac{1}{3}}$$



$$\theta = \tan^{-1}\left(\frac{1}{2}\right) = 0.4636$$

$$R = \sqrt{2^2 + (-1)^2} = \sqrt{5}$$

$$\theta = 0.4636$$

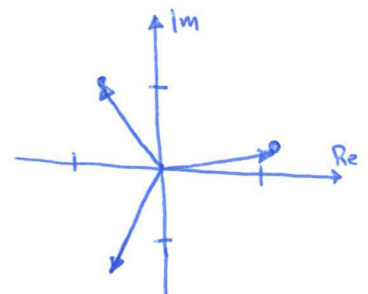
$$= \sqrt[6]{5}e^{0.1545i} = 1.292 + 0.201i$$

$$\theta = 0.4636 + 2\pi$$

$$= \sqrt[6]{5}e^{2.249i} = -0.820 + 1.018i$$

$$\theta = 0.4636 + 4\pi$$

$$= \sqrt[6]{5}e^{4.343i} = -0.472 - 1.219i$$



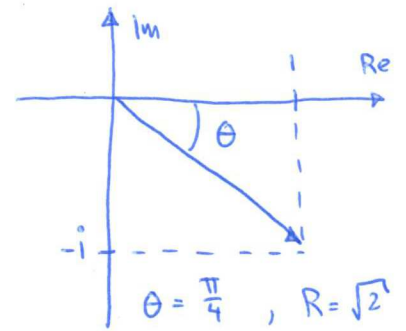
$$\sqrt{2}z + i = 1$$

$$z = \frac{1}{2}(1-i)^2$$

$$= \frac{1}{2}(\sqrt{2} e^{-\frac{\pi}{4}i})^2$$

$$= \frac{1}{2}(2) e^{-\frac{\pi}{2}i}$$

$$= e^{-\frac{\pi}{2}i} = -i$$



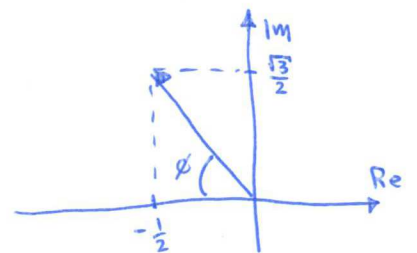
$$z^2 + z + 1 = 0$$

$$z = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{-1 \pm \sqrt{1-4}}{2}$$

$$= -\frac{1}{2} \pm \frac{1}{2}\sqrt{-3}$$

$$= -\frac{1}{2} \pm \frac{\sqrt{3}}{2}i = e^{2.094i}$$



$$\phi = \tan^{-1}\left(\frac{\sqrt{3}/2}{-1/2}\right) = 1.047$$

$$R = \sqrt{\left(-\frac{1}{2}\right)^2 + \left(\frac{\sqrt{3}}{2}\right)^2} = 1$$

$$\theta = \pi - 1.047 = 2.094$$

$$3e^{zi} = 2 - i$$

$$e^{zi} = \frac{2}{3} - \frac{1}{3}i$$

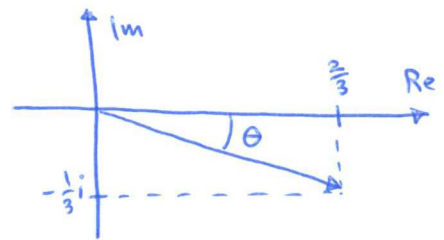
$$\ln(e^{zi}) = \ln\left(\frac{2}{3} - \frac{1}{3}i\right)$$

$$zi = \ln\left(\frac{2}{3} - \frac{1}{3}i\right)$$

$$= \ln\left(\frac{1}{3}\sqrt{5} e^{0.4636i}\right) = \ln\left(\frac{1}{3}\sqrt{5}\right) + \ln(e^{0.4636i}) = -0.2939 + 0.4636i$$

$$z = \left(\frac{-0.2939 + 0.4636i}{i} \right) \left(\frac{-i}{-i} \right) = \frac{0.2939i - 0.4636i^2}{-i^2}$$

$$z = 0.4636 + 0.2939i = 0.5489 e^{0.5650i}$$



$$\theta = \tan^{-1}\left(\frac{-1/3}{2/3}\right) = 0.4636$$

$$R = \sqrt{\left(\frac{2}{3}\right)^2 + \left(-\frac{1}{3}\right)^2} = \frac{1}{3}\sqrt{5}$$

$$\ln z + i = 2 - 4i$$

$$\ln z = 2 - 5i$$

$$e^{\ln(z)} = e^{2-5i}$$

$$z = e^2 e^{-5i}$$

$$z = 7.389 e^{-5i}$$

$$= 2.096 + 7.086i$$