1. Simplify the following expression and write your answer(s) in BOTH rectangular and polar form.

\[ (-1)^3 \quad \text{(Hint: } -1 = e^{j\pi}) \]

\[ \left( e^{j(\pi + 2\pi k)} \right)^{1/3} = e^{j(\pi/3 + 2\pi k/3)} \]

\[ k = 0, 1, 2 \]

\[ e^{j(\pi/3)} = \frac{1}{2} + \frac{\sqrt{3}}{2}j \]

\[ e^{j(2\pi/3)} = -1 + 0j \]

\[ e^{j(5\pi/3)} = \frac{1}{2} - \frac{\sqrt{3}}{2}j \]

2. Solve the following equation for \( \theta \). Give your answer(s) in EITHER rectangular or polar form.

\[ \text{Im}\left\{ e^{j\theta} \left[ \frac{\sqrt{2}}{2} - j\frac{\sqrt{2}}{2} \right] \right\} = 0 \]

\[ \text{Im}\left\{ e^{j\theta} \left[ e^{-j\pi/4} \right] \right\} = 0 \Rightarrow \text{Im}\left\{ e^{j(\theta - \pi/4)} \right\} = 0 \]

\[ \text{Im}\left\{ \cos(\theta - \pi/4) + jsin(\theta - \pi/4) \right\} = 0 \]

\[ \sin(\theta - \pi/4) = 0 \]

\[ \theta - \pi/4 = 2k\pi \quad \text{or} \quad \theta - \pi/4 = \pi + 2k\pi \]

\[ \theta = \pi/4 + 2k\pi \quad \text{or} \quad \theta = 5\pi/4 + 2k\pi \]