EEL 3135 Quiz 1

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

\[ (-j)^{\frac{1}{3}} \quad (\text{Hint: } -j = e^{\frac{j\pi}{2}}) \]

\[ e^{j \left( -\frac{\pi}{6} + \frac{4\pi k}{6} \right)} \]

\[ e^{-\frac{\pi}{6}} = \frac{\sqrt{3}}{2} - \frac{i}{2} \]

\[ e^{j \left( \frac{\pi}{2} \right)} = 0 + j \]

\[ e^{j \left( 7\pi/6 \right)} = -\frac{\sqrt{3}}{2} - \frac{i}{2} \]

\[ k = 0, 1, 2 \]

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

\[ \text{Im} \left\{ e^{j\theta} \left[ -\frac{1}{2} + j\frac{\sqrt{3}}{2} \right] \right\} = 0 \]

\[ \text{Im} \left\{ e^{j\theta} \left[ e^{j\pi/3} \right] \right\} = 0 \rightarrow \text{Im} \left\{ e^{j(\theta + 2\pi/3)} \right\} = 0 \]

\[ \text{Im} \left\{ \cos(\theta + 2\pi/3) + jsin(\theta + 2\pi/3) \right\} = 0 \]

\[ \sin(\theta + 2\pi/3) = 0 \]

\[ \theta + 2\pi/3 = 2\pi k \]

\[ \theta = -2\pi/3 + 2\pi k \quad \text{or} \quad \theta = \pi/3 + 2\pi k \]