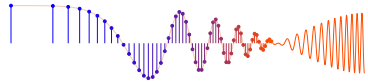


PROBLEM:

Solve the following equation for θ:

$$\Im m\{(-1+j)e^{j\theta}\} = \tfrac{1}{2}$$

Give the answers in radians. Make sure that you find *all* possible answers.

McClellan, Schafer and Yoder, *Signal Processing First*, ISBN 0-13-065562-7.
Prentice Hall, Upper Saddle River, NJ 07458.

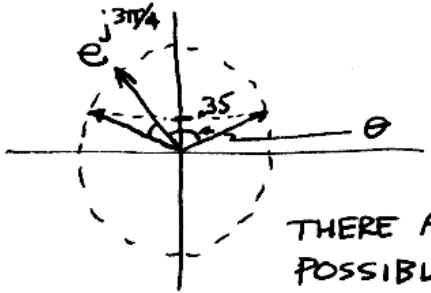
SOLUTION

$$\mathrm{Im}\{(-1+j)e^{j\theta}\} = \frac{1}{2}$$

$$\mathrm{Im}\{\sqrt{2}e^{j(3\pi/4+\theta)}\} = \frac{1}{2} \Rightarrow \mathrm{Im}\{e^{j(\frac{3\pi}{4}+\theta)}\} = \frac{1}{2\sqrt{2}} \approx 0.35$$

From the geometrical picture there are 2 answers:

$$3\pi/4 + \theta = \begin{cases} 0.115\pi = 20.7^\circ \\ 0.885\pi \end{cases}$$



THERE ARE TWO POSSIBLE ANSWERS

$$\Rightarrow \theta = \begin{cases} -0.635\pi \\ 0.135\pi \end{cases}$$