

Homework Problem #003

- (a) Given $x = 3.9e^{j4.2}$ and $y = 0.63e^{-j1.8}$, determine $\Re\{x \times y^*\}$ and $\Im\{x \times y^*\}$. (The angles are in radians.)

$$\begin{aligned} xy^* &= (3.9e^{j4.2})(0.63e^{j1.8}) = (3.9)(0.63)e^{j(4.2+1.8)} \\ &= 2.46e^{j6} \end{aligned}$$

$$\Re\{xy^*\} = 2.46 \cos 6 = (2.46)(0.96) = 2.36$$

$$\Im\{xy^*\} = 2.46 \sin 6 = (2.46)(-0.28) = -0.69$$

- (b) Express the complex number $z = \frac{3+j2}{2-j3} + 3e^{-j50^\circ}$ in exponential form, with the angle in degrees.

$$\frac{3+j2}{2-j3} \cdot \frac{2+j3}{2+j3} = \frac{6+j4+j9-6}{4+9} = j$$

$$\begin{aligned} 3e^{-j50^\circ} &= 3 \cos 50^\circ - j 3 \sin 50^\circ \\ &= 1.93 - j 2.30 \end{aligned}$$

$$z = j + 1.93 - j 2.30$$

$$= 1.93 - j 1.30$$

$$= 2.33 e^{-j34^\circ}$$