

7.5.1. Transforme a su forma polar:

Para realizar los ejercicios utilizaremos las siguientes formulas

Para el modulo $C = \sqrt{A^2 + B^2}$

Para el ángulo $\theta = \tan^{-1} \left(\frac{B}{A} \right)$

a) $2 + j3$

$$C = \sqrt{2^2 + 3^2} = \sqrt{13}$$
$$\theta = \tan^{-1} \left(\frac{3}{2} \right) = 56.31^\circ$$
$$\sqrt{13} < 56.31^\circ$$

b) $-8 + j6.2$

$$C = \sqrt{(-8)^2 + 6.2^2} = 10.12$$
$$\theta = \tan^{-1} \left(\frac{6.2}{-8} \right) = -37.77^\circ \Rightarrow 180 - 37.77 = 142.23$$
$$10.12 < 142.23^\circ$$

c) $4.3 - j2.8$

$$C = \sqrt{4.3^2 + 2.8^2} = 5.13$$
$$\theta = \tan^{-1} \left(\frac{-2.8}{4.3} \right) = -33.07^\circ$$
$$5.13 < -33.07^\circ$$

d) $-6 - j3.2$

$$C = \sqrt{(-6)^2 + (-3.2)^2} = 6.8$$
$$\theta = \tan^{-1} \left(\frac{-3.2}{-6} \right) = 28.07^\circ \Rightarrow -180 + 28.07 = -151.93$$
$$6.8 < -151.93^\circ$$

7.5.2. Transforme a su forma rectangular:

Para realizar los ejercicios utilizaremos las siguientes formulas

Para $A = C \cos(\theta)$

Para $B = C \sin(\theta)$

a) $36 < -10^\circ$

$$A = 36 \cos(-10) = 35.45$$
$$B = 36 \sin(-10) = -6.25$$
$$35.45 - j6.25$$

b) $28.7 < 135^\circ$

$$A = 28.7 \cos(135) = -20.29$$

$$B = C \sin(\theta) = 28.7 \sin(135) = 20.29$$

$$-20.29 + j20.29$$

c) $11.2 < 28^\circ$

$$A = 11.2 \cos(28) = 9.88$$

$$B = 11.2 \sin(28) = 5.25$$

$$9.88 + j5.25$$

d) $45 < -117.9^\circ$

$$A = 45 \cos(-117.9) = -21.05$$

$$B = 45 \sin(-117.9) = -39.76$$

$$-21.05 - j39.76$$

7.5.3. Realice las siguientes operaciones paso a paso, y represente el resultado tanto en su forma rectangular como en su forma polar

Utilizamos las formulas antes mencionadas

a) $10 + j3 - (7 + j2)(3 < -115^\circ) - 2j$

$$C = \frac{7 + j2}{\sqrt{7^2 + 2^2}} = 7.28$$

$$\theta = \tan^{-1}\left(\frac{2}{7}\right) = 15.94^\circ$$

$$7.28 < 15.94^\circ$$

$$(7.28 < 15.94^\circ)(3 < -115^\circ) = 21.84 < -99.06^\circ$$

$$\Rightarrow 21.84 < -99.06^\circ$$

$$A = 21.84 \cos(-99.06) = -3.44$$

$$B = 21.84 \sin(-99.06) = -21.57$$

$$\Rightarrow -3.44 - j21.57$$

$$10 + j3 + 3.44 + j21.57 - 2j = 0$$

$$\Rightarrow \mathbf{13.44 + j22.57}$$

Ahora la expresamos en su forma polar

$$C = \sqrt{13.44^2 + 22.57^2} = 26.26$$

$$\theta = \tan^{-1}\left(\frac{22.57}{13.44}\right) = 59.22^\circ$$

$$\mathbf{26.26 < 59.22^\circ}$$

$$b) \mathbf{6.8 < 125.3^\circ} + \frac{\mathbf{4.5 < -11.5^\circ}}{\mathbf{7.6 - j1.2}}$$

$$7.6 - j1.2$$

$$C = \sqrt{7.6^2 + (-1.2)^2} = 7.69$$

$$\theta = \tan^{-1}\left(\frac{-1.2}{7.6}\right) = -8.97^\circ$$

$$\Rightarrow \mathbf{7.69 < -8.97^\circ}$$

$$6.8 < 125.3^\circ + \frac{4.5 < -11.5^\circ}{7.69 < -8.97^\circ}$$

$$\frac{4.5 < -11.5^\circ}{7.69 < -8.97^\circ} = \frac{4.5}{7.69} < -11.5 + 8.97^\circ$$

$$\Rightarrow \mathbf{0.58 < -2.53^\circ}$$

$$(6.8 < 125.3^\circ) + (0.58 < -2.53^\circ)$$

$$A = 6.8 \cos(125.3) = -3.92$$

$$B = 6.8 \sin(125.3) = 5.54$$

$$\Rightarrow \mathbf{-3.92 + j5.54}$$

$$A = 0.58 \cos(-2.53) = 0.57$$

$$B = 0.58 \sin(-2.53) = -0.02$$

$$\Rightarrow \mathbf{0.57 - j0.02}$$

$$(-3.92 + j5.54) + (0.57 - j0.02)$$

$$\Rightarrow \mathbf{-3.35 + j5.52}$$

Pasamos a su forma polar

$$C = \sqrt{(-3.35)^2 + 5.52^2} = 6.45$$

$$\theta = \tan^{-1}\left(\frac{5.52}{-3.35}\right) = -58.74^\circ \Rightarrow 180 - 58.74 = 121.26$$

$$\Rightarrow \mathbf{6.45 < 121.26^\circ}$$

$$c) \frac{\mathbf{34 + j28.6}}{\mathbf{4 < -20.8^\circ}} - \mathbf{51.2 < 215^\circ}$$

$$34 + j28.6$$

$$C = \sqrt{34^2 + 28.6^2} = 44.43$$

$$\theta = \tan^{-1}\left(\frac{28.6}{34}\right) = 40.07^\circ$$

$$\Rightarrow \mathbf{44.43 < 40.07^\circ}$$

$$\frac{44.42 < 40.06^\circ}{4 < -20.8^\circ} = \frac{44.43}{4} < 40.06^\circ + 20.8^\circ$$

$$\Rightarrow \mathbf{11.10 < 60.87^\circ}$$

$$(11.10 < 60.87^\circ) - (51.2 < 215^\circ)$$

$$A = 11.10 \cos(60.87) = 5.40$$

$$B = 11.10 \sin(60.87) = 9.70$$

$$\Rightarrow \mathbf{5.4 + j9.70}$$

$$A = 51.2 \cos(215) = -41.94$$

$$B = 51.2 \sin(215) = -29.36$$

$$\Rightarrow \mathbf{-41.94 - j29.36}$$

$$(5.4 + j9.70) - (-41.94 - j29.36)$$

$$\Rightarrow \mathbf{47.34 + j39.06}$$

Pasamos a su forma polar

$$C = \sqrt{47.34^2 + 39.06^2} = 61.37$$

$$\theta = \tan^{-1}\left(\frac{39.06}{47.34}\right) = 39.52^\circ$$

$$\Rightarrow \mathbf{61.37 < 39.52^\circ}$$