8.5.1. Transforme a su forma polar:

$a)\ 2 + 3j$

$$\boldsymbol{c} = \sqrt{2^2 + 3^2} = 3.605$$

$$\boldsymbol{\theta} = tg^{-1}\left(\frac{3}{2}\right) = 56.309$$

$$\boldsymbol{= 3.605 < 56.309°}$$

b) $-8 + 6.2\,\boldsymbol{j} =$

$$\boldsymbol{c} = \sqrt{(-8)^2 + 6.2^2} = 10.121$$

$$\boldsymbol{\theta} = tg^{-1}\left(\frac{6.2}{-8}\right) = -37.775°$$

$$\boldsymbol{= 10.121 < -37.775°}$$

$c)\ 4.3 - 2.8\,j$

$$\boldsymbol{c} = \sqrt{4.3^2 + (-2.8)^2} = 5.131$$

$$\boldsymbol{\theta} = tg^{-1}\left(-\frac{2.8}{4.3}\right) = -33.070$$

$$\boldsymbol{= 5.131 < -33.070°}$$

d) $-6 - 3.2\,\boldsymbol{j} =$

$$\boldsymbol{c} = \sqrt{(-6)^2 + 3.2^2} = 6.8$$

$$\boldsymbol{\theta} = tg^{-1}\left(\frac{3.2}{-6}\right) = -28.072°$$

$$\boldsymbol{= 6.8 < -28.072°}$$

8.5.2 Transforme a su forma rectangular:

a) $36 \angle -10° =$

$$\boldsymbol{A} = 36\cos(-10) = 35.453$$

$$\boldsymbol{B} = 36\sin(-10) = j - 6.251$$

$$\boldsymbol{= 35.453 - j6.251}$$

$b)\ 28.7 < 135°$

$$\boldsymbol{A} = 28.7\cos(135) = -20.293$$

$$\boldsymbol{B} = 28.7\sin(135) = j20.29$$

$$\boldsymbol{= -20.293 + j20.29}$$

c) $11.2 \angle 28° =$

$$\boldsymbol{A} = 11.2\cos(28) = 9.889$$

$$\boldsymbol{B} = 11.2\sin(28) = j5.258$$

$$\boldsymbol{=9.889 - j5.258}$$

$d)\ 45 < -117.9°$

$\boldsymbol{A} = 45\cos(-117.9) = -21.056$

$\boldsymbol{B} = 45\sin(-117.9) = j - 39.769$

$\boldsymbol{= -21.056 - j39.769}$

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

$$a)\ \frac{10 + j3}{j2} - (7 + j2)(3 < -115)$$

Pasamos la multiplicación y división a forma polar

$$\boldsymbol{c} = \sqrt{10^2 + 3^2} = 10.440$$

$$\boldsymbol{\theta} = tg^{-1}\left(\frac{3}{10}\right) = 16.699°$$

$$\boldsymbol{= 10.440 < 16.699°}$$

$$\boldsymbol{c} = \sqrt{0^2 + 2^2} = 2$$

$$\boldsymbol{\theta} = tg^{-1}\left(\frac{2}{0}\right) = 90°$$

$$\boldsymbol{= 2 < 90°}$$

$$\boldsymbol{c} = \sqrt{7^2 + 2^2} = 7.280$$

$$\boldsymbol{\theta} = tg^{-1}\left(\frac{2}{7}\right) = 15.945°$$

$$\boldsymbol{= 7.280 < 15.945°}$$

Reescribimos la ecuación

$$\frac{10.440 < 16.699°}{2 < 90°} - (7.280 < 15.945°)(3 < -115°)$$

Resolvemos la división

$$\left(\frac{10.440}{2}\right) < (16.699 - 90)$$

$$5.22 < -73.301$$

Resolvemos la multiplicación

$$\left(7.280 * 3 < 15.945° + (-115°)\right)$$

$$21.84 < -99.055$$

Reescribimos la ecuación y transformamos a rectangular

$$(5.22 < -73.301) - (21.84 < -99.055)$$

$$\boldsymbol{A} = 5.22\cos(-73.301) = 1.531$$

$$\boldsymbol{B} = 5.22\sin(-73.301) = j - 5.105$$

$$\boldsymbol{= 1.531 - j5.105}$$

$$\boldsymbol{A} = 21.84\cos(-99.055) = -3.305$$

$$\boldsymbol{B} = 21.84\sin(-99.055) = j - 20.738$$

$$\boldsymbol{= -3.305 - j20.738}$$

Resolvemos la ecuación

$$(1.531 - j5.105) - (-3.305 - j20.738)$$

$$\boldsymbol{Rectangular: 4.836 + j15.723}$$

$$\boldsymbol{Polar: 16.449 < 72.90°}$$

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

Pasamos la división a forma polar

$$\boldsymbol{c} = \sqrt{7.6^2 + (-1.2)^2} = 7.694$$

$$\boldsymbol{\theta} = tg^{-1}\left(-\frac{1.2}{7.6}\right) = -8.97°$$

$$\boldsymbol{= 7.694 < 8.97°}$$

Reescribimos la ecuación

$$6.8 < 125.3° + \frac{4.5 < -11.5°}{7.694 < 8.97°}$$

Resolvemos la división

$$\left(\frac{4.5}{7.694}\right) < (-11.5 - 8.97)$$

$$0.584 < -20.47$$

Reescribimos la ecuación y transformamos a rectangular

$$6.8 < 125.3° + 0.584 < -20.47$$

$$\boldsymbol{A} = 6.8\cos(125.3) = -3.929$$

$$\boldsymbol{B} = 6.8\sin(125.3) = j5.549$$

$$\boldsymbol{= -3.929 + j5.549}$$

$$\boldsymbol{A} = 0.584\cos(-20.47) = 0.547$$

$$\boldsymbol{B} = 0.584\sin(-20.47) = -j0.204$$

$$\boldsymbol{= 0.547 - j0.204}$$

Resolvemos la ecuación

$$(-3.929 + j5.549) + (0.547 - j0.204)$$

$$\boldsymbol{Rectangular: -3.382 + j5.345}$$

$$\boldsymbol{Polar: 6.325 < 122.32°}$$

$$c)\ \frac{34 + j28.5}{4 < -20.8°} - 51.2 < 215°$$

Pasamos la división a forma polar

$$\boldsymbol{c} = \sqrt{34^2 + (28.5)^2} = 44.364$$

$$\boldsymbol{\theta} = tg^{-1}\left(\frac{28.5}{34}\right) = 39.970°$$

$$\boldsymbol{= 44.364 < 39.970°}$$

Reescribimos la ecuación

$$\frac{44.364 < 39.970°}{4 < -20.8°} - 51.2 < 215°$$

Resolvemos la división

$$\left(\frac{44.364}{4}\right) < (39.970 - 8.97)$$
$$11.091 < 31°$$

Reescribimos la ecuación y transformamos a rectangular

$$11.091 < 31° - 51.2 < 215°$$

$$\boldsymbol{A} = 11.091\cos(31) = 9.50$$
$$\boldsymbol{B} = 11.091\sin(31) = j5.712$$
$$= 9.50 + \boldsymbol{j5}.712$$

$$\boldsymbol{A} = 51.2\cos(215) = -41.94$$
$$\boldsymbol{B} = 51.2\sin(215) = -j29.367$$
$$= -41.94 - \boldsymbol{j}29.367$$

Resolvemos la ecuación

$$(9.50 + \boldsymbol{j5}.712) + (-41.94 - \boldsymbol{j}29.367)$$
$$\boldsymbol{Rectangular}: -\boldsymbol{3}2.44 - \boldsymbol{j}23.655$$
$$\boldsymbol{Polar}: 22.198 < -36.1°$$

8.5.4 Resuelva las operaciones anteriores por medio de la calculadora y compare resultados.

A

Calculadora:

$z_1 =$ 1.531 + -5.105 $\cdot i$

$z_2 =$ -3.305 + -20.738 $\cdot i$

Sumar | Restar | Multiplicar | Dividir

La resta de los complejos es

$$(1.531 - 5.105i) - (-3.305 - 20.738i) =$$
$$= (1.531 - (-3.305)) + (-5.105 - (-20.738))\,i =$$
$$= 4.836 + 15.633i$$

B

Calculadora:

$z_1 =$ -3.929 $+$ 5.549 $\cdot i$

$z_2 =$ 0.547 $+$ -0.204 $\cdot i$

Sumar | Restar | Multiplicar | Dividir

La suma de los complejos es

$$(-3.929 + 5.549i) + (0.547 - 0.204i) =$$
$$= (-3.929 + 0.547) + (5.549 - 0.204)\,i =$$
$$= -3.382 + 5.345i$$

C

Calculadora:

$z_1 =$ 9.50 $+$ 5.712 $\cdot i$

$z_2 =$ -41.94 $+$ -29.367 $\cdot i$

Sumar | Restar | Multiplicar | Dividir

La suma de los complejos es

$$(9.5 + 5.712i) + (-41.94 - 29.367i) =$$
$$= (9.5 - 41.94) + (5.712 - 29.367)\,i =$$
$$= -32.44 - 23.655i$$