PRÁCTICA No. 8 FASORES.

8.1. OBJETIVO DE LA PRÁCTICA

Realizar operaciones aritméticas con números complejos, tanto en su forma polar como rectangular.

8.2. REQUISITOS PREVIOS

Investigue: el concepto de fasor en su forma rectangular y polar. Así mismo su representación gráfica.

8.3. INFORMACIÓN GENERAL

Los números complejos permiten realizar operaciones matemáticas con cantidades fasoriales y son muy útiles en el análisis de circuitos de ca. Con el sistema de los números complejos se puede sumar, restar, multiplicar y dividir cantidades que tienen tanto magnitud como ángulo.

8.4. MATERIAL Y EQUIPO REQUERIDO

Cantidad	Elemento
1	Calculadora Científica

8.5. PROCEDIMIENTO

8.5.1. Transforme a su forma polar:

a) 2 + 3 j =

$C < \theta$

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

$C = \sqrt{2^2 + 3^2} = \sqrt{13}$

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

$\theta = 56.3099$

$C < \theta = \sqrt{13} < 56.309$

b) -8 + 6.2 j =

$\pm A \pm B = C < \theta$
$C = \sqrt{A^2 + B^2}$
$C = \sqrt{(-8)^2 + (6.2)^2} = 10.121$
$\theta = \tan^{-1}\left(\frac{\pm B}{A}\right) = \tan^{-1}\left(\frac{6.2}{-8}\right)$
$\theta = 180 - 37.77 = 142.224$
$C < \theta = 10.121 < 142.224$

c) 4.3 – 2.8 j =

$\pm A \pm B = C < \pm\theta$
$C = \sqrt{A^2 + B^2}$
$C = \sqrt{(4.3)^2 + (-2.8)^2} = 5.13127$
$\theta = \tan^{-1}\left(\frac{\pm B}{A}\right) = \tan^{-1}\left(\frac{-2.8}{4.3}\right)$
$\theta = -33.0706$
$C < \theta = 5.13127 < -33.0706$

d) -6 – 3.2 j =

$\pm A \pm B = C < \pm\theta$
$C = \sqrt{A^2 + B^2}$
$C = \sqrt{(-6)^2 + (-3.2)^2} = 6.8$
$\theta = \tan^{-1}\left(\frac{\pm B}{A}\right)$
$\theta = 180 - 28.0724 = -151.9275$
$C < \theta = 6.8 < -151.9275$

8.5.2 Transforme a su forma rectangular:

a) 36 | -10° =

$C < \pm\theta = \pm A \pm B$
$A = C\cos(\theta)$
$B = C\sin(\theta)$
$A = 36\cos(-10) = 35.4530$
$B = 36\sin(-10) = -\text{j}6.2513$
$36 < -10 = 35.453 - \text{j}6.2513$

b) 28.7 | 135° =

$C < \pm\theta = \pm A \pm B$
$A = C\cos(\theta)$
$B = C\sin(\theta)$
$A = 28.7\cos(135) = -20.293$
$B = 28.7\sin(135) = \text{j}20.293$
$36 < -10 = -20.293 + \text{j}20.293$

c) 11.2 | 28° =

$C < \pm\theta = \pm A \pm B$
$A = C\cos(\theta)$
$B = C\sin(\theta)$
$A = 11.2\cos(28) = 9.889$
$B = 11.2\sin(28) = \text{j}5.258$
$11.2 < 28 = 9.889 + \text{j}5.25808$

d) 45 | -117.9° =

$C < \pm\theta = \pm A \pm B$
$A = C\cos(\theta)$
$B = C\sin(\theta)$
$A = 45\cos(-117.9) = -21.0568$
$B = 45\sin(-117.9) = -\text{j}39.7694$

$45 < -117.9 = -21.056 - \text{j}39.769$

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

a) 10 + 3 j - (7 + 2 j) (3 |-115°) = 2 j

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

$10 + \text{j}3 = C < \pm\theta$
$C = \sqrt{A^2 + B^2}$
$C = \sqrt{(10)^2 + (3)^2} = \sqrt{109}$
$\theta = \tan^{-1}\left(\frac{\pm B}{A}\right) = \tan^{-1}\left(\frac{3}{10}\right)$
$\theta = 16.699$
$C < \theta = \sqrt{109} < 16.699$

$\text{j}2 = 2 < 90$

$C < \pm\theta = \pm A \pm B$

$$A = \frac{\sqrt{109}}{2}\cos(-73.301) = 1.5$$
$$B = \frac{\sqrt{109}}{2}\sin(-73.301) = -j5$$

$$\frac{\sqrt{109}}{2} < -73.301 = 1.5 - \text{j}5$$

$$C < \pm\theta = \pm A \pm B$$
$$A = 3\cos(-115) = -1.267$$
$$B = 3\sin(-115) = -j2.7189$$
$$3 < -115 = -1.2678 - \text{j}2.7189$$

$$1.5 - \text{j}5 - (7 + j2)(-1.2678 - \text{j}2.7189)$$
$$= 4.9368 + \text{j}16.5679$$

Expresando en forma polar.

$$4.9368 + \text{j}16.5679 = C < \pm\theta$$
$$C = \sqrt{A^2 + B^2}$$
$$C = \sqrt{(4.9368)^2 + (16.5679)^2} = 17.2877$$
$$\theta = \tan^{-1}\left(\frac{\pm B}{A}\right) = \tan^{-1}\left(\frac{16.5679}{4.9368}\right)$$
$$\theta = 73.40732$$
$$C < \theta = 17.2877 < 73.40732$$

b) 6.8 |125.3° + 4.5 |-11.5° /7.6 – 1.2 j

Expresando en forma polar.

$$7.6 - 1.2\text{j} = C < \pm\theta$$
$$C = \sqrt{A^2 + B^2}$$
$$C = \sqrt{(7.6)^2 + (1.2)^2} = 7.6941$$
$$\theta = \tan^{-1}\left(\frac{\pm B}{A}\right) = \tan^{-1}\left(\frac{-1.2}{7.6}\right)$$
$$\theta = -8.972$$
$$C < \theta = 7.6941 < -8.972$$

$$\frac{4.5 < -11.5}{7.6941 < -8.972} = 0.5848 < -2.528$$
$$6.8 < 125.3 + 0.5848 < -2.528 = 6.4578 < 121.19$$
Expresando en forma rectangular.
$$C < \pm\theta = \pm A \pm B$$
$$A = C\cos(\theta)$$
$$B = C\sin(\theta)$$
$$A = 6.4578\cos(121.19) = -3.344$$

$B = 6.4578\sin(121.19) = \text{j}5.524$
$6.4578 < 121.19 = -3.344 + \text{j}5.524$

c) 34 + 28.5 j – 51.2 |215° =4 |-20.8°

$$\frac{34 + j28{,}5}{4 < -20{,}8} - 51{,}2 < 215$$

$$34 + j28{,}5 = 44{,}36 < 39{,}97$$

$$4 < -20{,}8$$

$$\frac{34 + j28{,}5}{4 < -20{,}8} = \frac{44{,}36 < 39{,}97}{4 < -20{,}8} = 11{,}09 < 60{,}77 = 5{,}41 + j9{,}67$$

$$51{,}2 < 215 = -41{,}94 - j29{,}36$$

$$\frac{34 + j28{,}5}{4 < -20{,}8} - 51{,}2 < 215 = 5{,}41 + j9{,}67 + 41{,}94 + j29{,}36 =$$

Forma rectangular

$\frac{34+j28{,}5}{4<-20{,}8} - 51{,}2 < 215 = 5{,}41 + j9{,}67 + 41{,}94 + j29{,}36$ =46,90+j39,03

Forma polar

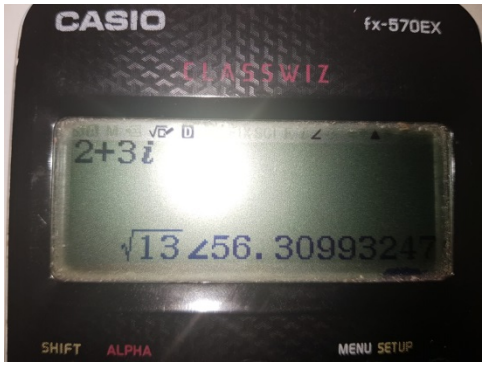
$$\frac{34 + j28{,}5}{4 < -20{,}8} - 51{,}2 < 215 = 5{,}41 + j9{,}67 + 41{,}94 + j29{,}36 = 61{,}17 < 39{,}53$$

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

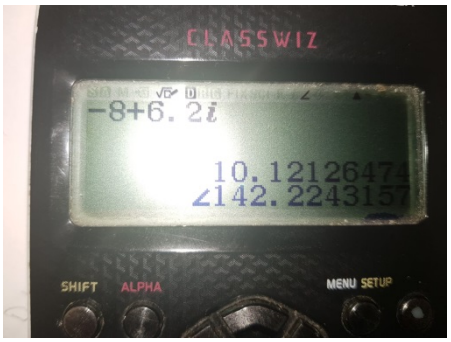
8.6. PROCEDIMIENTO

8.6.1. Transforme a su forma polar:

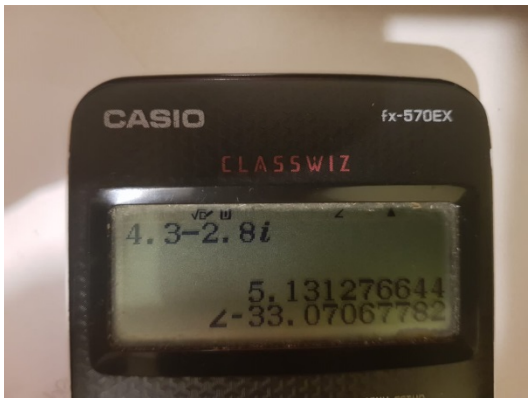
a) 2 + 3 j =



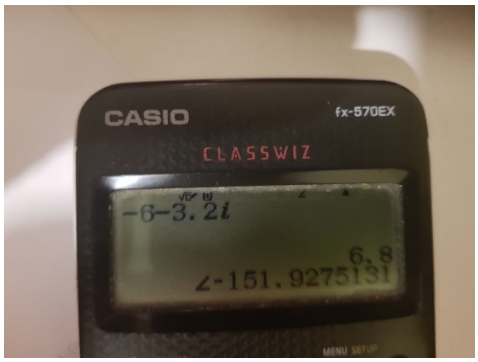
b) -8 + 6.2 j =



c) 4.3 – 2.8 j =

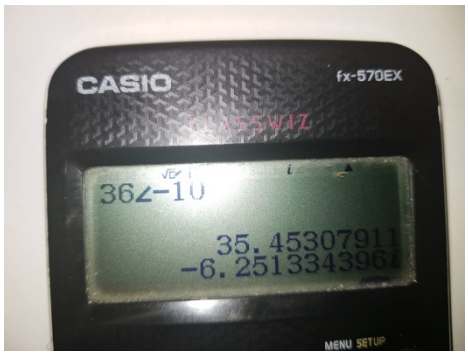


d) -6 – 3.2 j =

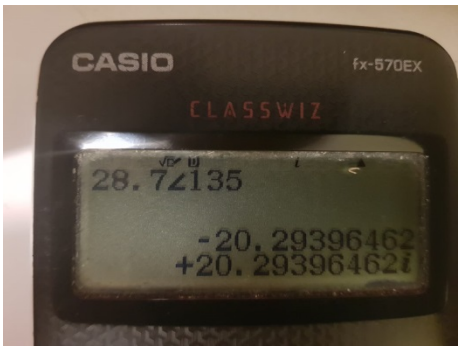


8.5.2 Transforme a su forma rectangular:

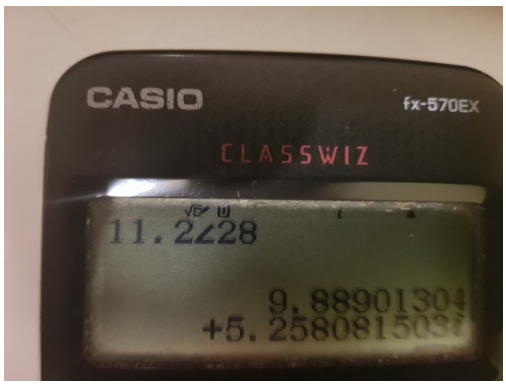
a) 36 | -10° =



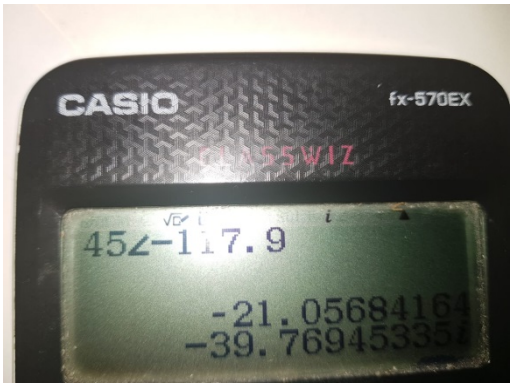
b) 28.7 | 135° =



c) 11.2 | 28° =



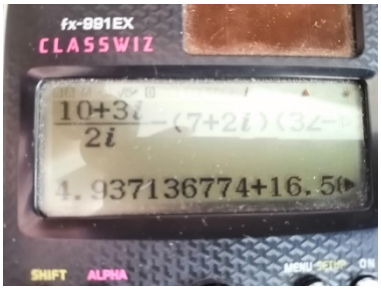
d) 45 | -117.9° =



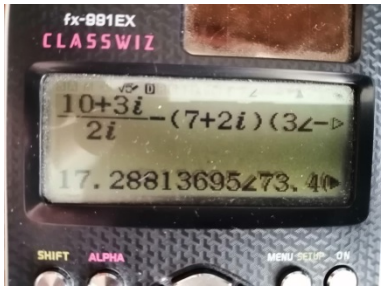
5.3. Realice las siguientes operaciones paso a paso, y represente el resultado tanto en su forma rectangular como en su forma polar.

a) 10 + 3 j - (7 + 2 j) (3 |-115°) = 2 j

Expresando en forma rectangular.

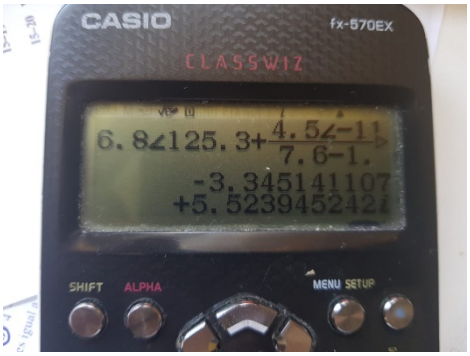


Expresando en forma polar.

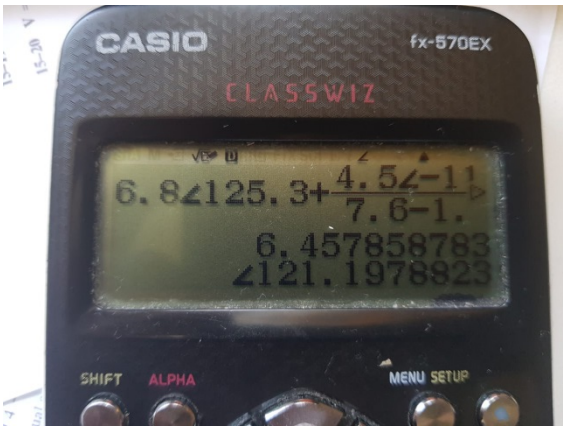


b) 6.8 |125.3° + 4.5 |-11.5° =7.6 – 1.2 j

Expresando en forma rectangular.

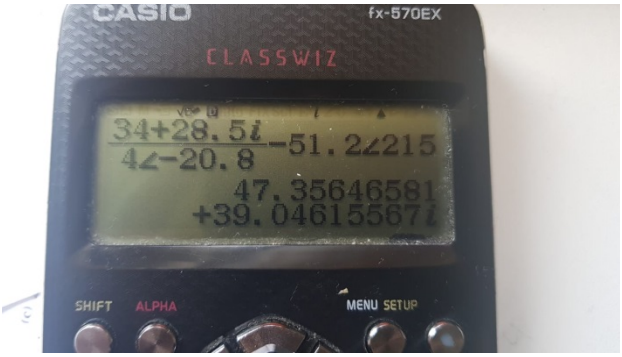


Expresando en forma polar.

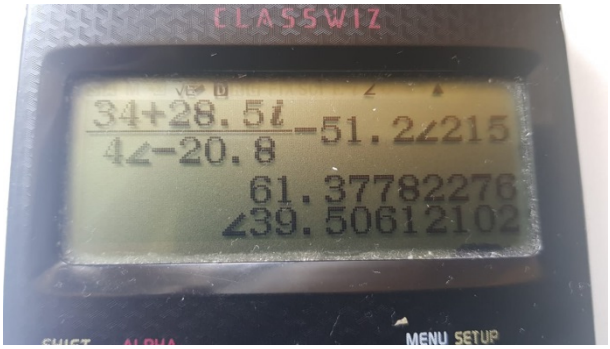


c) 34 + 28.5 j – 51.2 |215° =4 |-20.8°

Expresando en forma rectangular.



Expresando en forma polar.


CLASSWIZ
34+28.5i
4∠-20.8
-51.2∠215
61.37782276
∠39.50612102
MENU SETUP