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
Expresando en forma rectangular.
$C < \pm\theta = \pm A \pm B$
$A = C\cos(\theta)$
$B = C\sin(\theta)$
$A = 3\cos(-115) = -1.2678$
$B = 3\sin(-115) = -\text{j}2.7189$
$3 < -115 = -1.2678 - \text{j}2.7189$

$$A) = 10 + 3j - (7 + 2j)(-1.2678 - 2.7189j)$$
$$A) = 10 + 3j - (7 + 2j)(-1.2678 - 2.7189j)$$
$$A) = 10 + 3j - (-3.4368 - 21.5679j)$$
$$A) = 13.4368 + j24.5679$$

Expresando en forma polar.

$13.4368 + 24.5679j = C < \pm\theta$
$C = \sqrt{A^2 + B^2}$
$C = \sqrt{(13.4368)^2 + (24.5679)^2} = 28.002$
$\theta = \tan^{-1}\left(\frac{\pm B}{A}\right) = \tan^{-1}\left(\frac{24.5679}{13.4368}\right)$
$\theta = 61.3246$
$C < \theta = 28.002 < 61.3246$

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

Expresando en forma rectangular.
$C < \pm\theta = \pm A \pm B$
$A = C\cos(\theta)$
$B = C\sin(\theta)$
$A = 6.8\cos(125.3) = -3.9294$
$B = 6.8\sin(125.3) = \text{j}5.5497$
$6.8 < 125.3 = -3.9294 + \text{j}5.5497$

$A = 4.5\cos(-11.5) = 4.40966$
$B = 4.5\sin(-11.5) = -\text{j}0.8971$
$4.5 < -11.5 = 4.40966 - \text{j}0.8971$

$$A) = (-3.9294 + 5.5497j) + (4.40966 - 0.8971j)$$
$$A) = 0.48026 + j4.6526$$

Expresando en forma polar.

$0.48026 + 4.6526\text{j} = C < \pm\theta$
$C = \sqrt{A^2 + B^2}$
$C = \sqrt{(0.48026)^2 + (4.6526)^2} = 4.677$
$\theta = \tan^{-1}\left(\frac{\pm B}{A}\right) = \tan^{-1}\left(\frac{4.6526}{0.48026}\right)$
$\theta = 84.1065$
$C < \theta = 4.677 < 84.1065$

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

Expresando en forma rectangular.
$C < \pm\theta = \pm A \pm B$
$A = C\cos(\theta)$

$B = C\,\sin(\theta)$
$A = 51.2\cos(215) = -41.9405$
$B = 51.2\sin(215) = -\mathrm{j}29.3671$
$51.2 < 215 = -41.9405 - \mathrm{j}29.3671$

$$A) = (34 + 28.5j) - (-41.9405 - 29.3671j)$$
$$A) = \ 75.9405 + j57.8671$$

Expresando en forma polar.

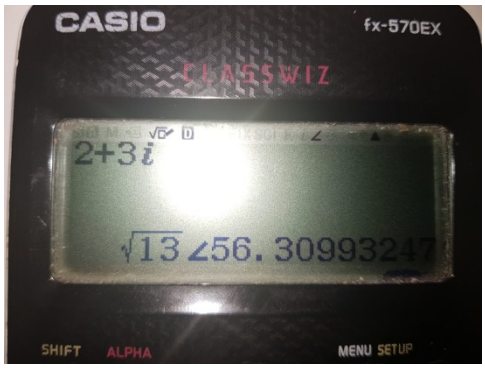
$74.9405 + 57.8671j = C < \pm\theta$
$C = \sqrt{A^2 + B^2}$
$C = \sqrt{(75.9405)^2 + (57.8671)^2} = 95.4754$
$\theta = \tan^{-1}\left(\frac{\pm B}{A}\right) = \tan^{-1}\left(\frac{57.8671}{75.9405}\right)$
$\theta = 37.3076$
$C < \theta = 95.4754 < 37.3076$

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

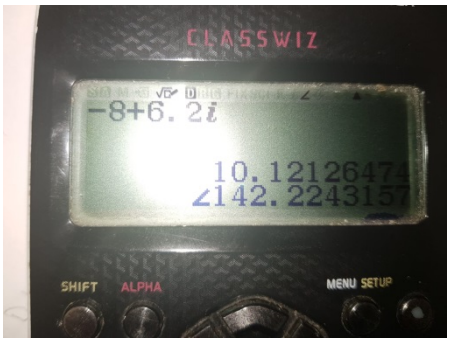
8.6. PROCEDIMIENTO

8.6.1. Transforme a su forma polar:

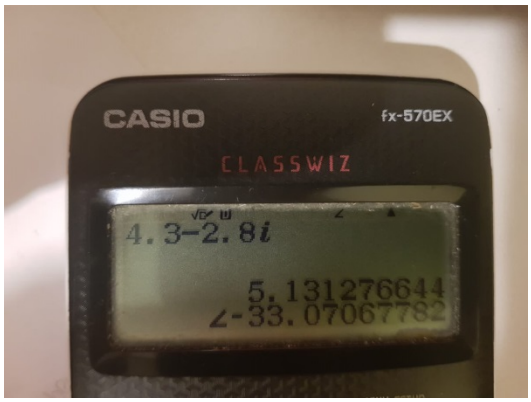
a) 2 + 3 j =



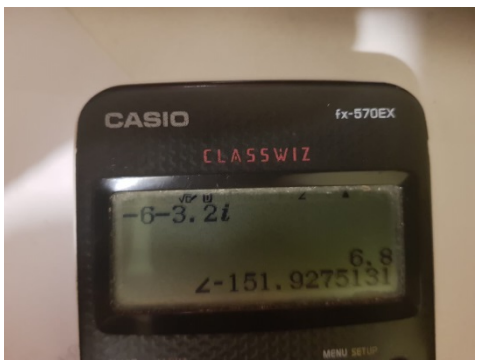
b) -8 + 6.2 j =



c) 4.3 – 2.8 j =



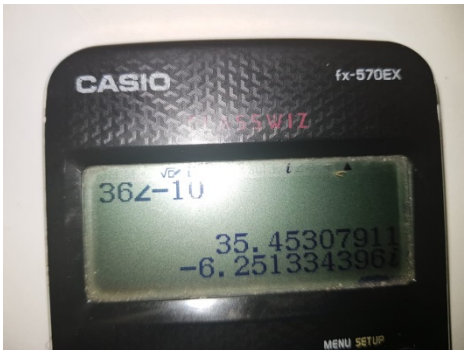
d) -6 – 3.2 j =



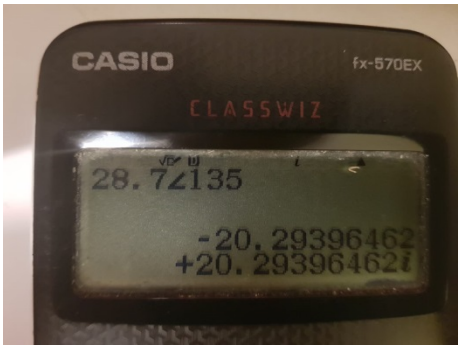
8.5.2 Transforme a su

forma rectangular:

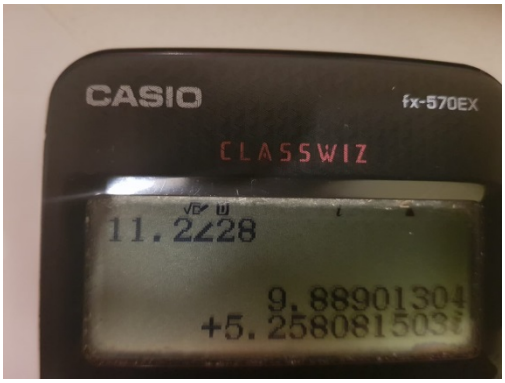
a) 36 | -10° =



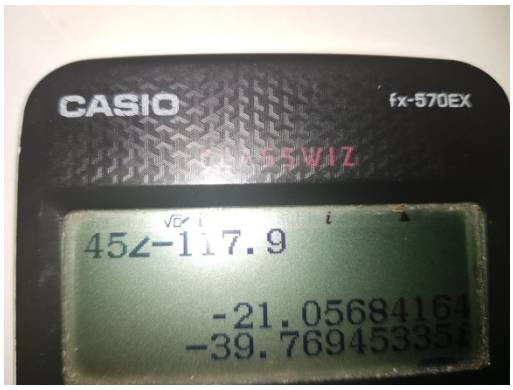
b) 28.7 | 135° =



c) 11.2 | 28° =



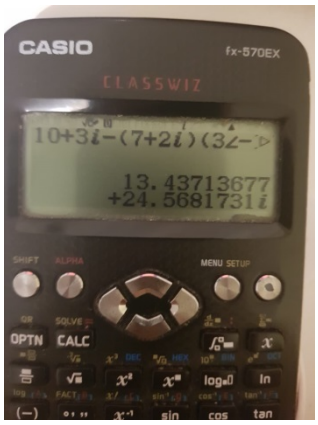
d) 45 | -117.9° =



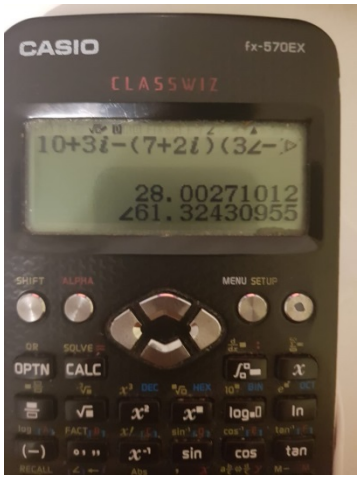
5.3. Realice las siguientes operaciones paso a paso, y represente el resultado tanto en su forma rectangular como en su forma polar.

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

Expresando en forma rectangular.

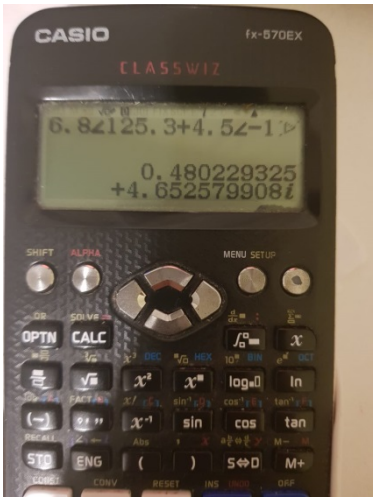


Expresando en forma polar.

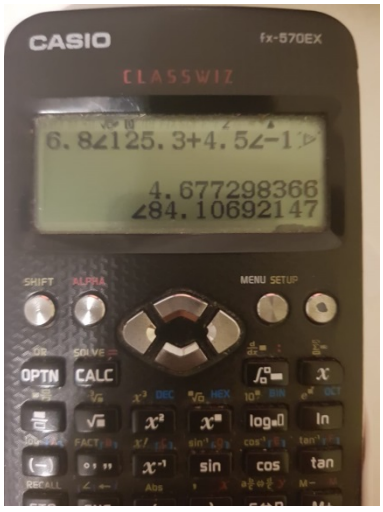


b) 6.8 |125.3° + 4.5 |-11.5° =7.6 – 1.2 j

Expresando en forma rectangular.

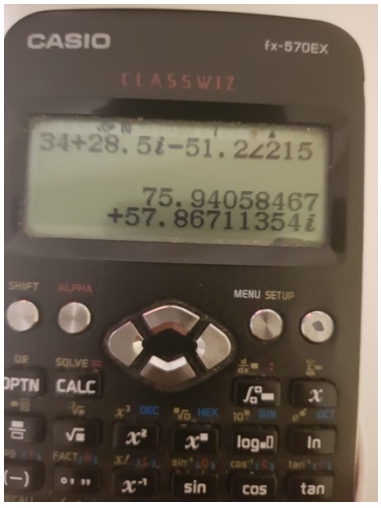


Expresando en forma polar.



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

Expresando en forma rectangular.



Expresando en forma polar.