

## 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)  $2 + 3j =$

$$C < \theta$$

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

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

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

$$\theta = 56.3099$$

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

**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)  $36 \angle -10^\circ =$**

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

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

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

$$A = 36 \cos(-10) = 35.4530$$

$$B = 36 \sin(-10) = -j6.2513$$

$$36 \angle -10 = 35.453 - j6.2513$$

**b)  $28.7 \angle 135^\circ =$**

$$\begin{aligned}
C < \pm\theta &= \pm A \pm B \\
A &= C \cos(\theta) \\
B &= C \sin(\theta) \\
A &= 28.7 \cos(135) = -20.293 \\
B &= 28.7 \sin(135) = j20.293 \\
36 < -10 &= -20.293 + j20.293
\end{aligned}$$

**c) 11.2 | 28° =**

$$\begin{aligned}
C < \pm\theta &= \pm A \pm B \\
A &= C \cos(\theta) \\
B &= C \sin(\theta) \\
A &= 11.2 \cos(28) = 9.889 \\
B &= 11.2 \sin(28) = j5.258 \\
11.2 < 28 &= 9.889 + j5.25808
\end{aligned}$$

**d) 45 | -117.9° =**

$$\begin{aligned}
C < \pm\theta &= \pm A \pm B \\
A &= C \cos(\theta) \\
B &= C \sin(\theta) \\
A &= 45 \cos(-117.9) = -21.0568 \\
B &= 45 \sin(-117.9) = -j39.7694 \\
45 < -117.9 &= -21.056 - j39.769
\end{aligned}$$

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

**a)  $10 + 3j - (7 + 2j)(3 \angle -115^\circ) = 2j$**

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

$$10 + j3 = \sqrt{109} \angle 16,69$$

$$\frac{10 + j3}{j2} = \frac{\sqrt{109} \angle 16,69}{2 \angle 90} = 5,22 \angle -73,31$$

$$(7 + j2) = \sqrt{53} < 15,94$$

$$3 < -115$$

$$(7 + j2)(3 < -115) = 21,84 < -99,05$$

$$\frac{10 + j3}{j2} - (7 + j2)(3 < -115) = \frac{\sqrt{109} < 16,69}{2 < 90} - 21,84 < -99,05 =$$

En forma polar

$$\frac{10 + j3}{j2} - (7 + j2)(3 < -115) = 5,22 < -73,31 - 21,84 < -99,05 = 17,28 < 73,41$$

En forma rectangular

$$17,28 < 73,41 = 4,93 + j16,56$$

**b)  $6.8 \angle 125.3^\circ + 4.5 \angle -11.5^\circ / 7.6 - 1.2j$**

***Expresando en forma polar.***

$$7.6 - 1.2j = C < \pm \theta$$

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

$$C = \sqrt{(7.6)^2 + (1.2)^2} = 7.6941$$

$$\theta = \tan^{-1} \left( \frac{\pm B}{A} \right) = \tan^{-1} \left( \frac{-1.2}{7.6} \right)$$

$$\theta = -8.972$$

$$C < \theta = 7.6941 < -8.972$$

$$\frac{4.5 < -11.5}{7.6941 < -8.972} = 0.5848 < -2.528$$

$$6.8 < 125.3 + 0.5848 < -2.528 = 6.4578 < 121.19$$

***Expresando en forma rectangular.***

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

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

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

$$A = 6.4578 \cos(121.19) = -3.344$$

$$B = 6.4578 \sin(121.19) = j5.524$$

$$6.4578 < 121.19 = -3.344 + j5.524$$

c)  $34 + 28.5 j - 51.2 \angle 215^\circ = 4 \angle -20.8^\circ$

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

$$34 + j28,5 = 44,36 \angle 39,97$$

$$4 \angle -20,8$$

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

$$51,2 \angle 215 = -41,94 - j29,36$$

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

Forma rectangular

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

Forma polar

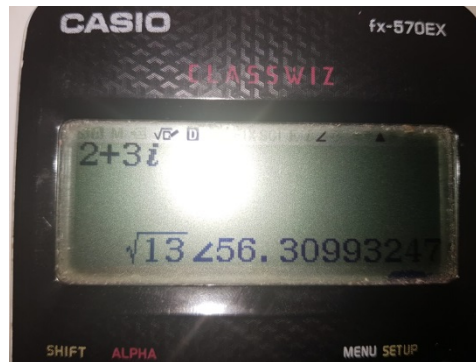
$$\frac{34 + j28,5}{4 \angle -20,8} - 51,2 \angle 215 = 5,41 + j9,67 + 41,94 + j29,36 = 61,17 \angle 39,53$$

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:

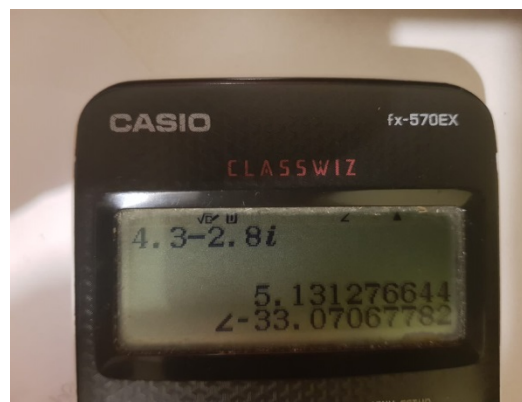
a)  $2 + 3j =$



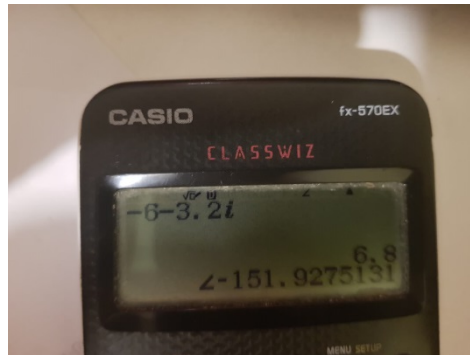
b)  $-8 + 6.2j =$



c)  $4.3 - 2.8j =$

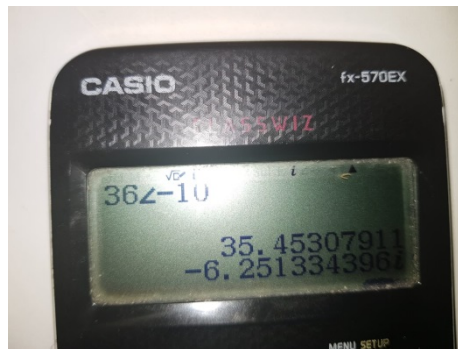


d)  $-6 - 3.2j =$

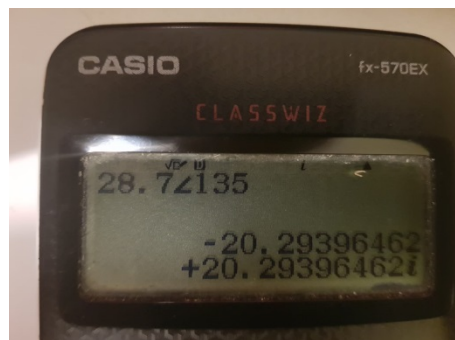


8.5.2 Transforme a su forma rectangular:

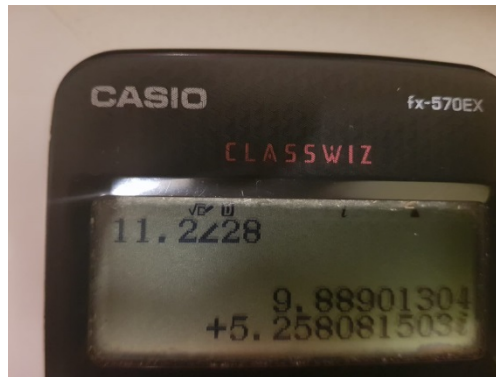
a)  $36 \angle -10^\circ =$



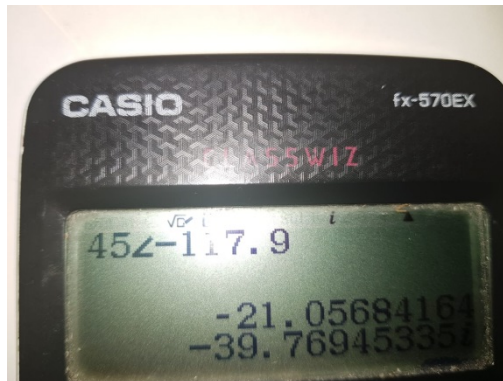
b)  $28.7 \angle 135^\circ =$



c)  $11.2 \angle 28^\circ =$

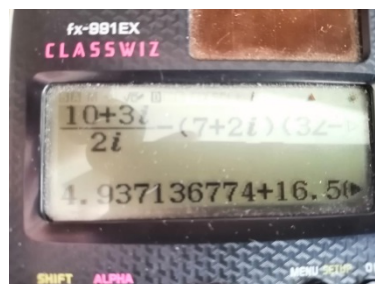


d)  $45 \angle -117.9^\circ =$



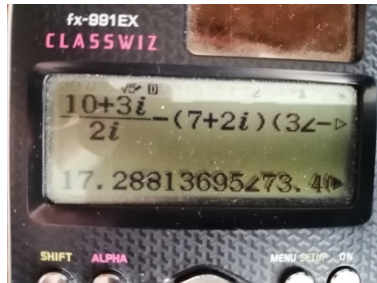
5.3. Realice las siguientes operaciones paso a paso, y represente el resultado tanto en su forma rectangular como en su forma polar.

a)  $10 + 3j - (7 + 2j)(3 \angle -115^\circ) = 2j$   
*Expresando en forma rectangular.*



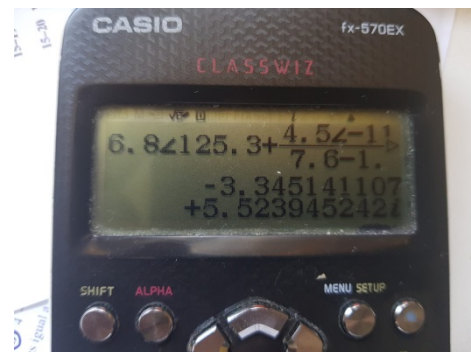


*Expresando en forma polar.*

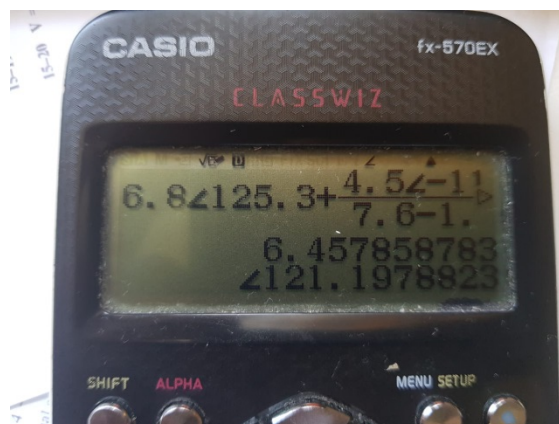


b)  $6.8 \angle 125.3^\circ + 4.5 \angle -11.5^\circ = 7.6 - 1.2j$

*Expresando en forma rectangular.*

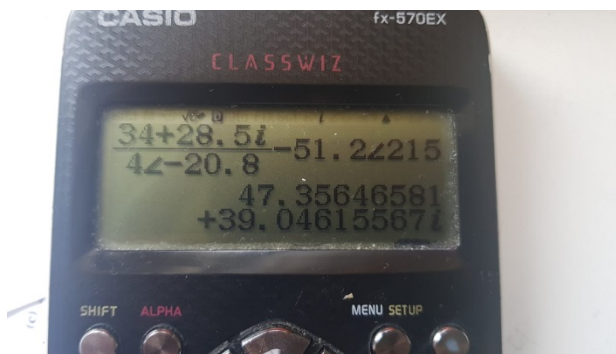


*Expresando en forma polar.*



c)  $34 + 28.5j - 51.2 \angle 215^\circ = 4 \angle -20.8^\circ$

*Expresando en forma rectangular.*



*Expresando en forma polar.*

