EJEMPLOS FORMA POLAR 2AB

EJEMPLO 1 : Calcular

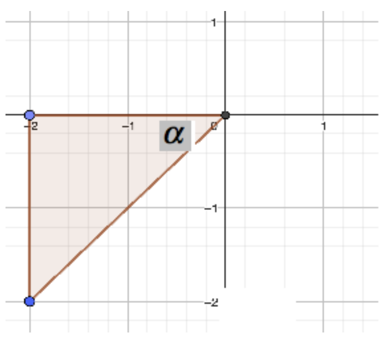
$$\frac{\left(-2-2i\right)^8}{\left(\sqrt{3}+i\right)^5}$$

SOLUCIÓN:

primero se transforma a polar cada uno de los complejos:

a) Sea $z=-2-2i$

$a=-2\ ;\ b=-2$



$$\alpha = arctg\left(\frac{b}{a}\right)$$

$$\alpha = arctg\left(\frac{-2}{-2}\right) = arctg(1)$$

$$\alpha = 45^o \ \Rightarrow \ \alpha = 180+45$$

$$\Rightarrow \alpha = 225^o$$

$$|z| = \sqrt{a^2+b^2}$$

$$|z| = \sqrt{(-2)^2+(-2)^2}$$

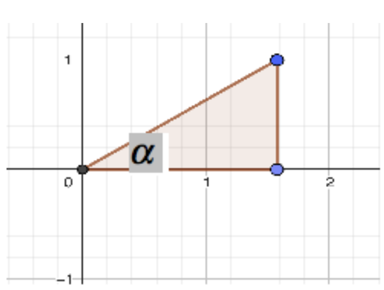
$$|z| = \sqrt{8} = 2\sqrt{2}$$

$$Z = |Z|\left(cos(\alpha)+i\,sen(\alpha)\right)$$

$$Z = 2\sqrt{2}\left(cos(225^o)+i\,sen(225^o)\right)$$

b) Sea $z_1=\sqrt{3}+i$

$a=\sqrt{3}\ ;\ b=1$



$$\alpha = arctg\left(\frac{b}{a}\right)$$

$$\alpha = arctg\left(\frac{\sqrt{3}}{1}\right) = arctg\left(\sqrt{3}\right)$$

$$\alpha = 60^o$$

$$\left|z_1\right| = \sqrt{a^2 + b^2}$$

$$\left|z_1\right| = \sqrt{\sqrt{3}^2 + \left(1\right)^2}$$

$$\left|z_1\right| = 2$$

$$Z_1 = \left|Z_1\right|\left(cos\left(\alpha\right) + i\,sen\left(\alpha\right)\right)$$

$$Z_1 = 2\left(cos\left(60^o\right) + i\,sen\left(60^o\right)\right)$$

Ahora haremos el cálculo en forma polar:

$$\frac{\left(-2-2i\right)^8}{\left(\sqrt{3}+i\right)^5} = \frac{\left[2\sqrt{2}\left(cos\left(225^o\right) + i\,sen\left(225^o\right)\right)\right]^8}{\left[2\left(cos\left(60^o\right) + i\,sen\left(60^o\right)\right)\right]^5}$$

$$= \frac{\left[2^{12}\left(cos\left(225\cdot 8\right) + i\,sen\left(225\cdot 8\right)\right)\right]}{\left[2^5\left(cos\left(60\cdot 5\right) + i\,sen\left(60\cdot 5\right)\right)\right]}$$

$$= \frac{\left[2^{12}\left(cos\left(1800^o\right) + i\,sen\left(1800^o\right)\right)\right]}{\left[2^5\left(cos\left(300^o\right) + i\,sen\left(300^o\right)\right)\right]}$$

$$= 2^7\left(cos\left(1800-300\right) + isen\left(1800-300\right)\right)$$

$$= 2^7\left(cos\left(1500^o\right) + isen\left(1500^o\right)\right)$$