Warm Up

Express the following in the form $a + b$i:

$$\frac{(1-i)^4}{\left(-1-i\sqrt{3}\right)^{10}}$$

$1 - i \Rightarrow (1,-1)$

Q4

$r = \sqrt{2}$

$\tan\theta = 1$

$(\text{Ref}\measuredangle = 45^\circ)$

$\theta = 315^\circ$

$= \underline{\sqrt{2}\,\text{cis}\,315^\circ}$

$(-1,-\sqrt{3})$ Q3

$r = \sqrt{1+3}$

$r = 2$

$\tan\theta = \sqrt{3}$

$(\text{Ref}\measuredangle = 60^\circ)$

$\theta = 240^\circ$

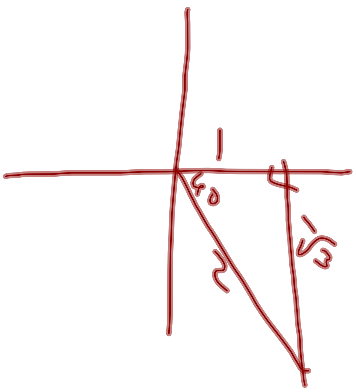
$= \underline{2\,\text{cis}\,240^\circ}$

$$= \frac{\left(\sqrt{2}\,\text{cis}\,315\right)^4}{\left(2\,\text{cis}\,240^\circ\right)^{10}}$$

P.A. = 300°

$$= \frac{2^2\,\text{cis}\,(1260)}{2^{10}\,\text{cis}\,(2400^\circ)} = 2^{-8}\,\text{cis}\,(-1140^\circ)$$

$$= \frac{1}{2^8}\left(\cos 300^\circ + i\sin 300^\circ\right)$$



$$= \frac{1}{2^8}\left(\frac{1}{2} + i\left(-\frac{\sqrt{3}}{2}\right)\right)$$

$$= \frac{1}{2^9} - \frac{\sqrt{3}}{2^9}i$$

$$\boxed{= \frac{1}{512}\left(1 - i\sqrt{3}\right)}$$

Review - Complex Numbers...

- operations using complex numbers.
  - add/subutract, multiplication, division (complex conjugate)
  - comparion method (Re = Re & Im = Im)
  - describing complex roots

- plotting polar coordinates (both in degrees and radians)

- switching forms: rectangular $\Rightarrow$ polar & polar $\Rightarrow$ rectangular

$\boxed{\tan\theta = \left|\frac{y}{x}\right|}$ $\boxed{r = \sqrt{x^2 + y^2}}$

$$\boxed{\cos\theta = \frac{x}{r} \quad so \quad x = r\cos\theta}$$

$$\boxed{\sin\theta = \frac{y}{r} \quad so \quad y = r\sin\theta}$$

- switching forms: complex number $\Rightarrow$ polar form (r cis θ)

$$\boxed{\begin{array}{l} a + bi \Rightarrow r\cos\theta + (r\sin\theta)i \\ \therefore \quad polar\ form\ is... \qquad r\underline{cis}\,\theta = r\left(\underline{c}os\theta + \underline{i}\sin\theta\right) \end{array}}$$

$\boxed{\tan\theta = \left|\frac{y}{x}\right|}$ $\boxed{r = \sqrt{x^2 + y^2}}$

- operations in polar form

$$\boxed{z_1 \bullet z_2 = r_1 r_2\left[\cos(\theta_1 + \theta_2) + i\sin(\theta_1 + \theta_2)\right]}$$

- multiply all "r" values together
- add all angles together

$$\boxed{\frac{z_1}{z_2} = \frac{r_1}{r_2}\left[\cos(\theta_1 - \theta_2) + i\sin(\theta_1 - \theta_2)\right]}$$

- divide "r" values
- subtract angles

- DeMoivre's Theorem

$$\boxed{\left[r(\cos\theta + i\sin\theta)\right]^n = r^n\left[\cos(n\theta) + i\sin(n\theta)\right]}$$

Review Time!!!

Review - Complex Numbers.doc

Review Solns - Complex Numbers.doc

Attachments

Review - Complex Numbers.doc

Review Solns - Complex Numbers.doc