

6 Multiply n divide mod arg form DONE

26 November 2024 10:17

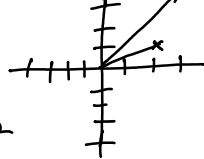
$$z_1 = 2 + i$$

$$z_2 = z_1^2$$

$$= (2 + i)^2$$

$$= 4 + 4i + i^2$$

$$= 3 + 4i$$

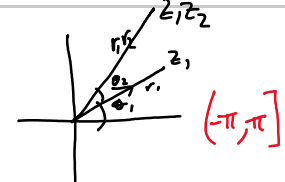


$$|z_1| = r_1$$

$$\arg(z_1) = \theta_1$$

$$|z_2| = r_2$$

$$\arg(z_2) = \theta_2$$



$$|z_1 z_2| = |z_1| |z_2|$$

$$\arg(z_1 z_2) = \arg(z_1) + \arg(z_2) = \theta_1 + \theta_2$$

③

$$z_1 = r_1 (\cos \theta_1 + i \sin \theta_1)$$

$$z_2 = r_2 (\cos \theta_2 + i \sin \theta_2)$$

$$z_1 z_2 = r_1 r_2 (\cos \theta_1 \cos \theta_2 - \sin \theta_1 \sin \theta_2 + i (\sin \theta_1 \cos \theta_2 + \cos \theta_1 \sin \theta_2))$$

$$= r_1 r_2 ((\cos \theta_1 \cos \theta_2 - \sin \theta_1 \sin \theta_2) + i (\sin \theta_1 \cos \theta_2 + \cos \theta_1 \sin \theta_2))$$

$$= r_1 r_2 (\cos(\theta_1 + \theta_2) + i \sin(\theta_1 + \theta_2))$$

$$|z_1| |z_2| = r_1 r_2 = |z_1 z_2|$$

$$\arg(z_1 z_2) = \theta_1 + \theta_2 = \arg(z_1) + \arg(z_2)$$

④

$$|z_1 z_2| = |z_1| |z_2|$$

$$\arg(z_1 z_2) = \arg(z_1) + \arg(z_2)$$

$$\text{let } \frac{z_1}{z_2} = w \Rightarrow z_1 = w z_2$$

$$\arg(z_1) = \arg(w z_2)$$

$$= \arg(w) + \arg(z_2)$$

$$\Rightarrow \arg(w) = \arg(z_1) - \arg(z_2)$$

$$\arg\left(\frac{z_1}{z_2}\right) = \arg(z_1) - \arg(z_2)$$

$$\left|\frac{z_1}{z_2}\right| = \frac{|z_1|}{|z_2|}$$

$$|z_1| = |w z_2| = |w| |z_2|$$

$$\Rightarrow |w| = \frac{|z_1|}{|z_2|} = \left|\frac{z_1}{z_2}\right|$$

$$\arg\left(\frac{z_1}{z_2}\right) = \arg(z_1) - \arg(z_2)$$