Precalculus

6-07 Trigonometric Form of a Complex Number Operations

Multiplication and Division

- If $z_1 = r_1(\cos\theta + i\sin\theta)$ and $z_2 = r_2(\cos\theta + i\sin\theta)$, then

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

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

If $z_1 = 3\left(\cos\frac{\pi}{2} + i\sin\frac{\pi}{2}\right)$ and $z_2 = 6\left(\cos\frac{\pi}{4} + i\sin\frac{\pi}{4}\right)$, find

$z_1 z_2$ $\frac{z_1}{z_2}$

Exponents

$$z^n = r^n(\cos(n\theta) + i\sin(n\theta))$$

Let $z = 1 + i$, find z^4

Roots of Complex Numbers

$$\sqrt[n]{z} = \sqrt[n]{r}\left(\cos\left(\frac{\theta}{n} + \frac{2\pi k}{n}\right) + i\sin\left(\frac{\theta}{n} + \frac{2\pi k}{n}\right)\right)$$

- Where k = 0, 1, 2, …, n − 1
- These are _____out evenly around a circle with _____$\sqrt[n]{r}$

Find the cube roots of $-6 + 6i$