Answer on Question #58300 – Math – Complex Analysis

Question

Express

8i

in polar form

Solution

z=a+ib=|z|(cosφ+isinφ), where $|z|=\sqrt{a^2+b^2}$ and

$$\varphi=\begin{cases}\arccos\left(\frac{a}{|z|}\right),\ b\geq 0,|z|>0,\\ -arccos\left(\frac{a}{|z|}\right),b<0,|z|>0,\\ \quad undefined,|z|=0,\end{cases}$$

or

$$\varphi=\begin{cases} arctan\frac{b}{a}, & a>0,\\ \frac{\pi}{2}, & a=0,b>0,\\ -\frac{\pi}{2}, & a=0,b<0,\\ arctan\frac{b}{a}+\pi, & a<0,b\geq 0,\\ arctan\frac{b}{a}-\pi, & a<0,b<0.\end{cases}$$

z=8i, $a=0,b=8,$

$|z|=\sqrt{0+64}=8$; $\varphi=\arccos\left(\frac{0}{8}\right)=\frac{\pi}{2}$.

Then the polar form of z=8i is

z=8(cos$\frac{\pi}{2}$+isin$\frac{\pi}{2}$).

Answer: 8i=8(cos$\frac{\pi}{2}$+isin$\frac{\pi}{2}$).