

EX: Find the value (in polar form) of $(6 + j5)^{1/5}$.

ANS: $1.51e^{j7.96^\circ}$ (approx)

SOL'N: First, we convert the number being raised to a power to polar form:

$$6 + j5 = \sqrt{6^2 + 5^2} e^{j \tan^{-1}\left(\frac{5}{6}\right)} \approx 7.81e^{j39.8^\circ}$$

Now take the power inside the parentheses and use the identity

$$(ab)^n = a^n b^n$$

giving the answer:

$$(6 + j5)^{1/5} \approx 7.81^{1/5} e^{j39.8^\circ/5} \approx 1.51e^{j7.96^\circ}$$