EX: Find the polar form of $2.5 - j3.2$.

ANS: $4.06e^{-j52°}$

SOL'N: We express $2.5 - j3.2$ in polar form $Ae^{j\phi}$.

Use the pythagorean theorem to find magnitude A:

$$A = \sqrt{2.5^2 + 3.2^2} \approx 4.06$$

Set the tangent of the phase angle equal to the side opposite (imaginary part) over the side adjacent (real part):

$$\tan\phi = \frac{\text{Im}[2.5 - j3.2]}{\text{Re}[2.5 - j3.2]} = \frac{-3.2}{2.5} = -1.28$$

$$\phi = \tan^{-1}\left(\frac{-3.2}{2.5}\right) \approx -52° \text{ or } -0.9076 \text{ radians}$$

Our final answer:

$$2.5 - j3.2 \approx 4.06e^{-j52°}$$

NOTE: When calculating the inverse tangent, if we use -1.28 rather than both the imaginary and real parts, we have two possible values for ϕ that differ by 180 degrees. The ratio of the imaginary and real parts is the same for $1 + j$ and $-1 - j$, for example. Thus, it is necessary to keep track of which quadrant the complex number lies in if we wish to avoid confusion about the correct value of phase angle ϕ.