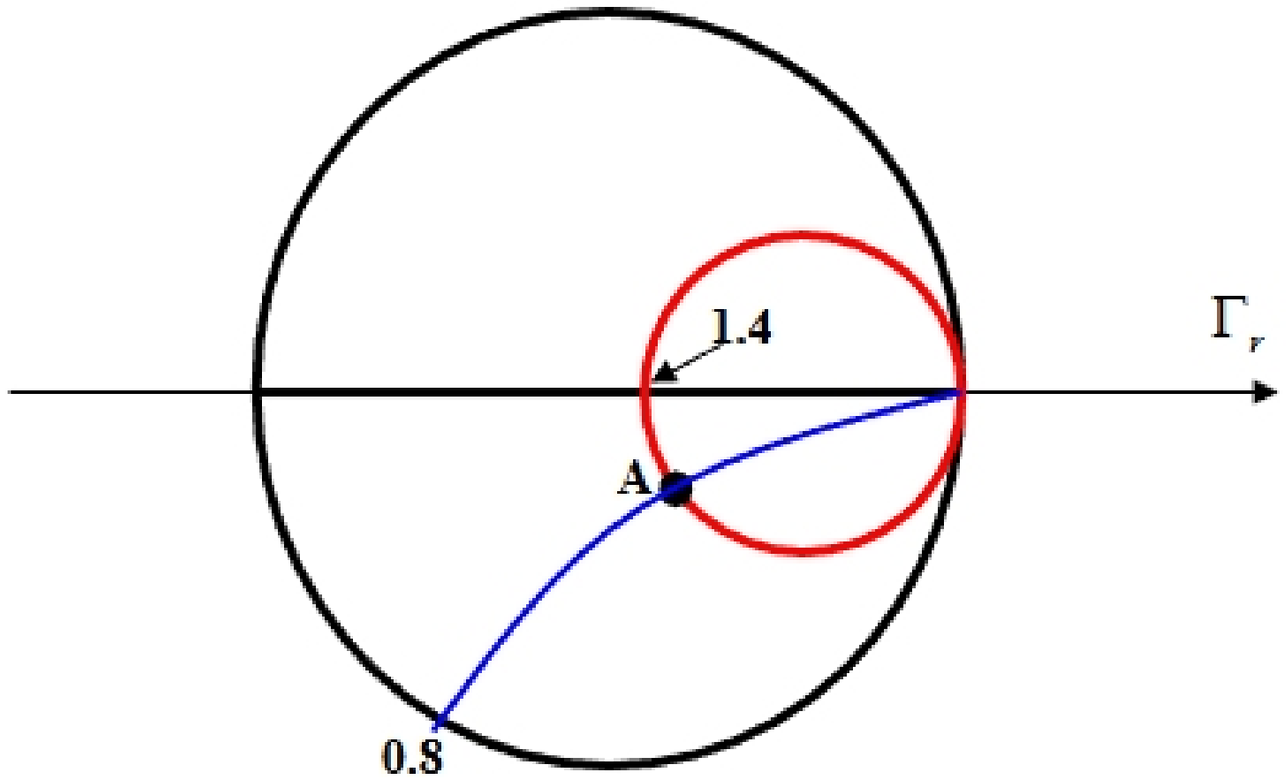
Example: Calculate the input impedance at z = -0.14 m on a transmission line with $Z_0 = 50[\Omega]$ that is connected to a load impedance of $Z_L = 70 - j40[\Omega]$, assuming $\beta = 2\pi\ [1/m]$.

Solution:

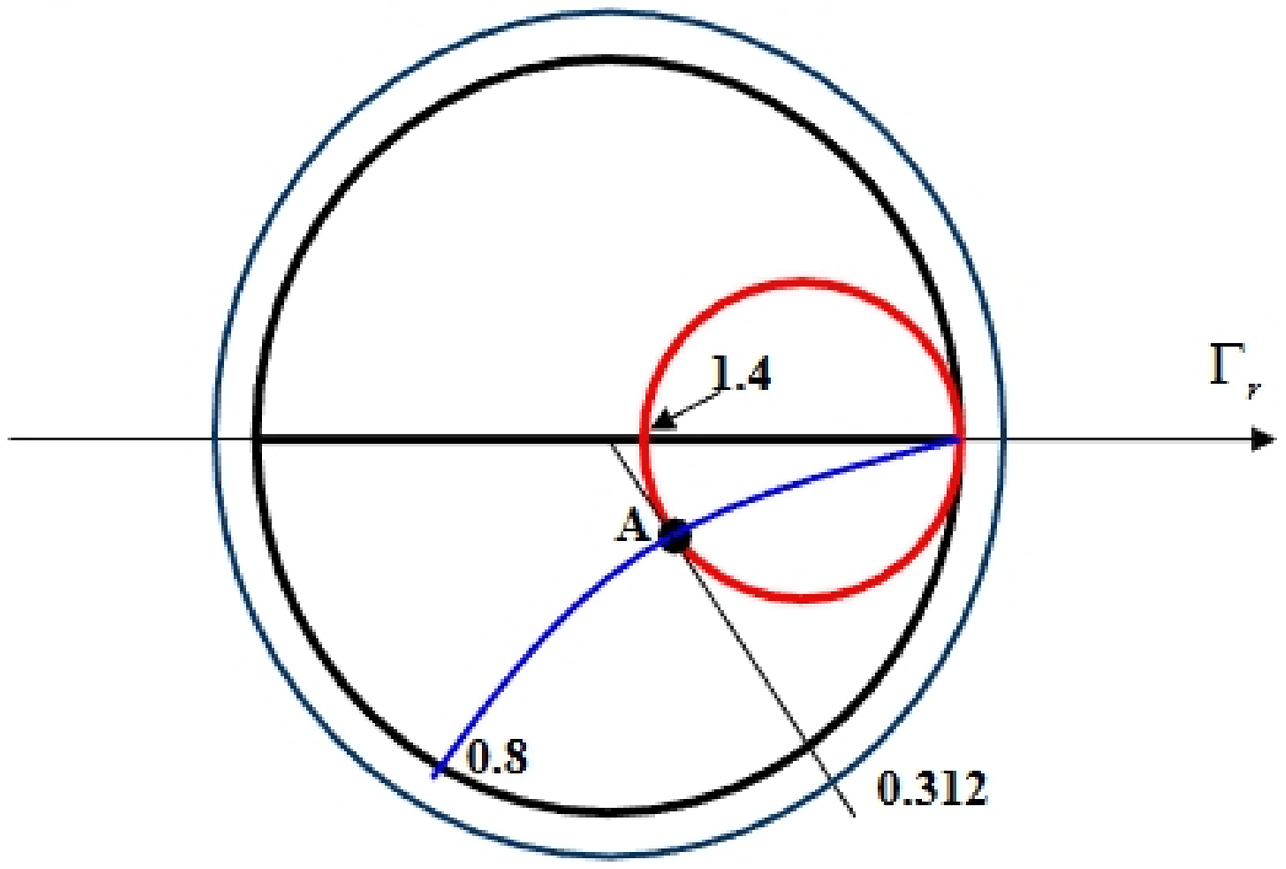
Step 1: Calculate the normalized load impedance:

$$z = (70 - j40)/50 = 1.4 - j0.8$$

Step 2: Locate the load impedance on the Smith Chart (A)
(Because the imaginary part is negative, the location is on the lower half of the Smith Chart).



Step 3: Find the distance reading (0.312)



Step 4: Calculate the electrical distance of movement (Note: in this example, the wavelength is 1m).

$$l/\lambda = 0.14/1 = 0.14$$

$$0.14 + 0.312 = 0.452$$

Step 5: Rotate the load impedance on the constant Γ-circle (in clockwise direction) for an electrical distance of 0.14 (Point B on the chart)