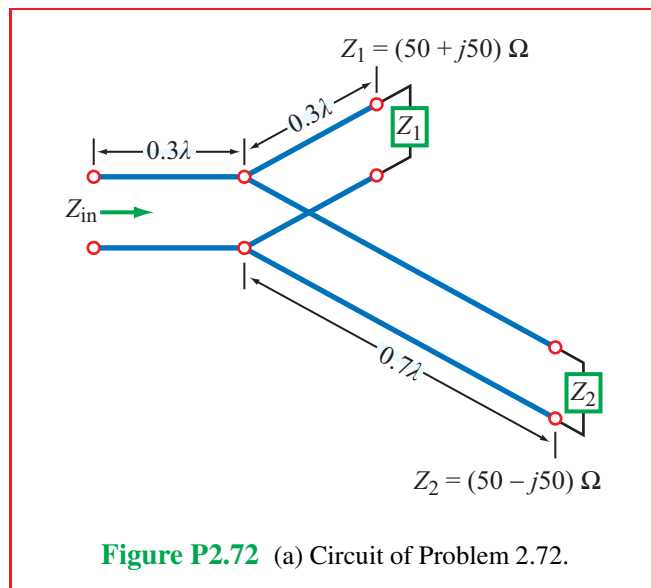


2.72 Determine Z_{in} of the feed line shown in Fig. P2.72. All lines are lossless with $Z_0 = 50 \Omega$.



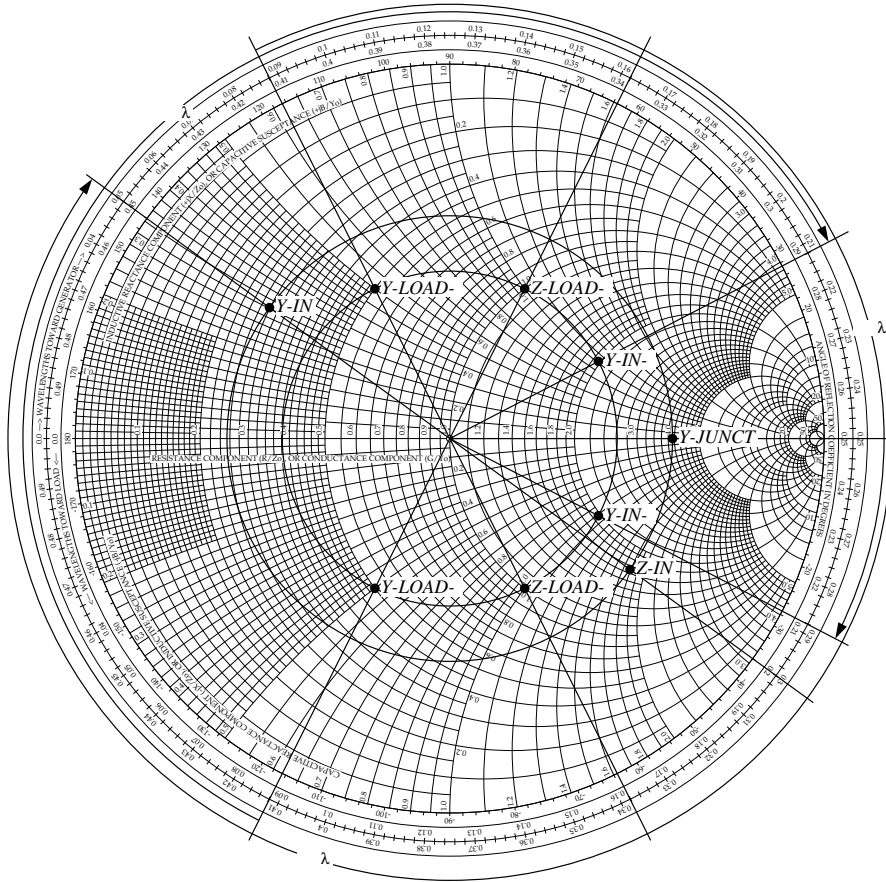


Figure 2.72: (b) Solution of Problem 2.72.

Solution: Refer to Fig. P2.72(b).

$$z_1 = \frac{Z_1}{Z_0} = \frac{50 + j50 \Omega}{50 \Omega} = 1 + j1$$

and is at point *Z-LOAD-1*.

$$z_2 = \frac{Z_2}{Z_0} = \frac{50 - j50 \Omega}{50 \Omega} = 1 - j1$$

and is at point *Z-LOAD-2*. Since at the junction the lines are in parallel, it is advantageous to solve the problem using admittances. y_1 is point *Y-LOAD-1*, which is at 0.412λ on the WTG scale. y_2 is point *Y-LOAD-2*, which is at 0.088λ on the WTG scale. Traveling 0.300λ from *Y-LOAD-1* toward the generator one obtains the

input admittance for the upper feed line, point $Y-IN-1$, with a value of $1.97 + j1.02$. Since traveling 0.700λ is equivalent to traveling 0.200λ on any transmission line, the input admittance for the lower line feed is found at point $Y-IN-2$, which has a value of $1.97 - j1.02$. The admittance of the two lines together is the sum of their admittances: $1.97 + j1.02 + 1.97 - j1.02 = 3.94 + j0$ and is denoted $Y-JUNCT$. 0.300λ from $Y-JUNCT$ toward the generator is the input admittance of the entire feed line, point $Y-IN$, from which $Z-IN$ is found.

$$Z_{in} = z_{in}Z_0 = (1.65 - j1.79) \times 50 \Omega = (82.5 - j89.5) \Omega.$$
