Homework #5

P1. Problem 2.63 in 8/E, 7/E, and 6/E (2.45 in 5/E, images below, and the answer sheet)

2.45 A 50-Ω lossless line 0.6λ long is terminated in a load with $Z_L = (50 + j25) \, \Omega$. At 0.3λ from the load, a resistor with resistance $R = 30 \, \Omega$ is connected as shown in Fig. 2.43. Use the Smith chart to find $Z_{in}$.

Figure 2.43: Circuit for Problem 2.45.

P2. Problem 2.72 AND 2.73 in 8/E, 7/E, and 6/E (2.48 and 2.49 in 5/E, image below, and the answer sheet)

2.48 Use the Smith chart to find $Z_{in}$ of the feed line shown in Fig. 2.44. All lines are lossless with $Z_0 = 50 \, \Omega$.

2.49* Repeat Problem 2.48 for the case where all three transmission lines are $\lambda/4$ in length.
P3. Problem 2.74 in 8/E

2.74 A 25 Ω antenna is connected to a 75 Ω lossless transmission line. Reflections back toward the generator can be eliminated by placing a shunt impedance Z at a distance l from the load (Fig. P2.74). Determine the values of Z and l.

![Circuit for Problem 2.74](image)

Figure P2.74 Circuit for Problem 2.74.

P4. Problems 2.68 AND 2.69 in 8/E, 7/E, and 6/E (2.46 and 2.47 in 5/E, image below, and the answer sheet)

2.46 A 50-Ω lossless line is to be matched to an antenna with \( Z_L = (75 - j20) \) Ω using a shorted stub. Use the Smith chart to determine the stub length and distance between the antenna and stub.

2.47* Repeat Problem 2.46 for a load with \( Z_L = (100 + j50) \) Ω.