Homework One

Transmission Line Theory

Text: Chapter 2, 4th Edition, Pozar

I. Selected problems of the text book (page 90):

1. P 2.2
2. P 2.7
3. P 2.8
4. P 2.12
5. P 2.13
6. P 2.16
7. P 2.17
8. P 2.19
9. P 2.20
10. P 2.21
11. P 2.25

II. Additional Problems:

1. For a lossless transmission line of length d and characteristic impedance Z_0 terminated by load impedance Z_L:
   a. Show that the input impedance is
   $$Zin = Z_0 \frac{1 + \Gamma_L e^{-j2\beta d}}{1 + \Gamma_L e^{-j2\beta d}}$$
   b. Prove the identity
   $$Z_0 \frac{1 + \Gamma_L e^{-j2\beta d}}{1 + \Gamma_L e^{-j2\beta d}} = Z_0 \frac{Z_L + jZ_0 \tan(\beta d)}{Z_0 + jZ_L \tan(\beta d)}$$
   c. Prove the identity
   $$Z(x)Z(x \pm \lambda/4) = {Z_0}^2$$
2. You are given the cascaded lossless transmissions lines in the below figure. Given $Z_{02} = 50\Omega$, $Z_{01} = 75\Omega$, $Z_L = 25 - j\,25\ \Omega$, $l_1 = \lambda/8$ and $l_2 = \lambda/4$, find the input impedance Z_{in2}