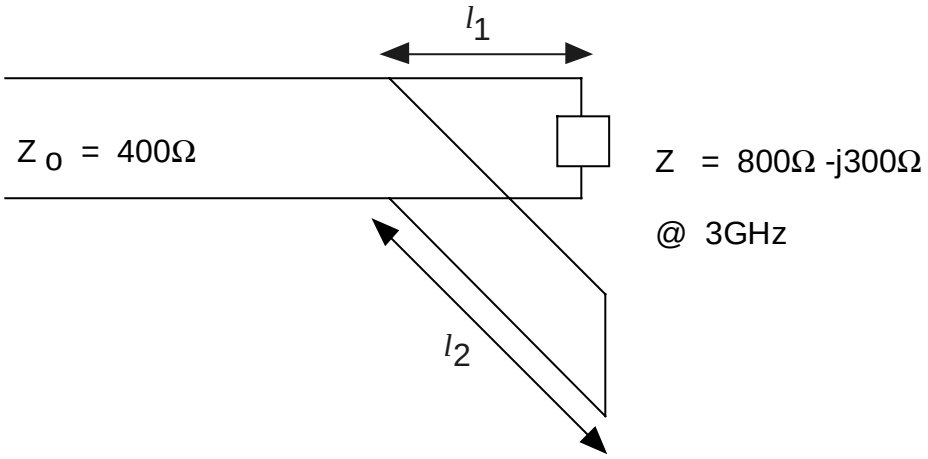
EE 363M Spring 2000
Homework Set 3
Wed. Feb. 23
Due: NOTE: DUE DATE WILL BE NOT SOONER THAN FRIDAY, MARCH 3!!

1. (10 pts) Based on Ramo, problem 5.8d (5.6d, 2nd ed.): An ideal transmission line is terminated by a resistance equal to half the characteristics impedance of the transmission line, i.e., $Z_{load} = Z_o / 2$.

a) To eliminate reflections back to the generator, what matching impedance must you use if you place the matching element in series, one quarter of a wavelength from the load (towards the generator)? If you place the matching element in parallel, one quarter of a wavelength from the load (towards the generator), what matching admittance must you use? HINT: The matching element may have both resistance/conductance and reactance/susceptance in this part of the problem.

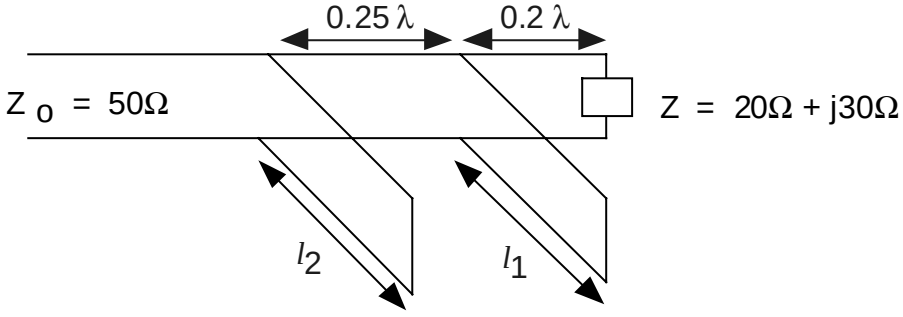
b) How far from the load must you locate a purely reactive series matching element, and what must its impedance value be? How far from the load must you locate a purely reactive parallel matching element, and what must its admittance value be?

2. (10 pts) A transmission line with characteristic impedance $Z_o = 400\ \Omega$ has a load connected to its end, with $Z_l = 800\Omega - j300\Omega$. The operating frequency is 3GHz. A single stub tuner is used to eliminate reflections at the input end of the T-line, as shown below:



Find the position of the stub relative to the load l_1, and the length of the tuning stub l_2.

3. (10 pts) Consider the double stub-tuning problem as shown below:



a) find the reactances that the stubs should add to the circuit in order to prevent reflection at the input end.

b) find the lengths of the two stubs (in terms of wavelengths).