INF-5481: RF Circuit, Theory and Design
Assignment 1
**Due Date: October 11th, 2010**

1- Show that the input impedance of a lossless transmission line repeats itself every $\lambda/2$, i.e., $Z_{in}(l_d) = Z_{in}(l_d + m(\lambda/2))$, where l_d is an arbitrary length, and m is an integer 0, 1, 2, …

2- A lossless transmission line is terminated with a 100 Ω load. If the SWR on the line is 1.5 , find the two possible values for the characteristic impedance of the line.

3- A 75 Ω coaxial transmission line has a length of 20 cm and is terminated with a load impedance of 37.5 + j75 Ω. If the dielectric constant of the line is 2.56 and the frequency is 3 GHz, find the input impedance to the line, the reflection coefficient at the load, the reflection coefficient at the input and the SWR on the line.

4- A load impedance of $Z_L = 80 + j20$ Ω, is to be matched to a $Z_0 = 100$ Ω line using a length l of lossless line of characteristic impedance Z_1. Find the required Z_1 (real) and l.

5- A generator is connected to a transmission line as shown below. Find the voltage as a function of z along the transmission line. Plot the magnitude of this voltage for $-l < z < 0$.
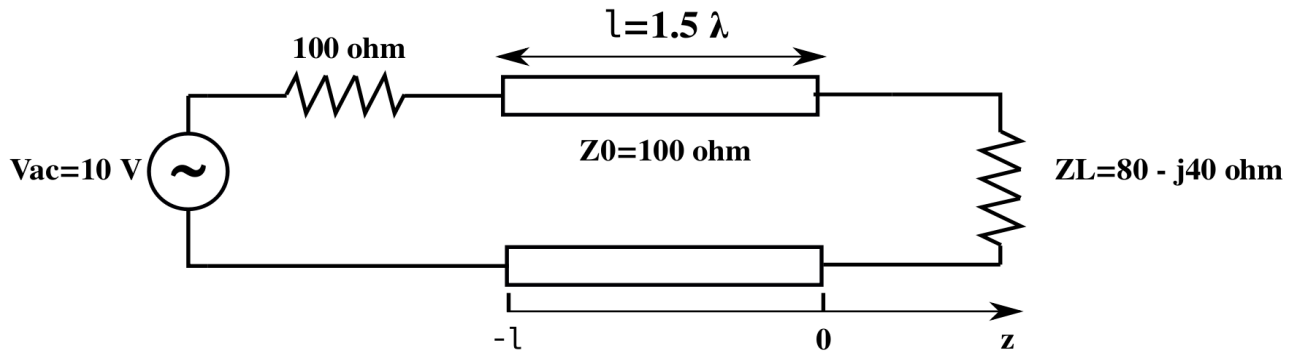
6- Find the reflection coefficient from the 100 Ω load and VSWR in the $\lambda/4$ line in the following circuit. Also find the V(0) and the power delivered to the 100 Ω load.