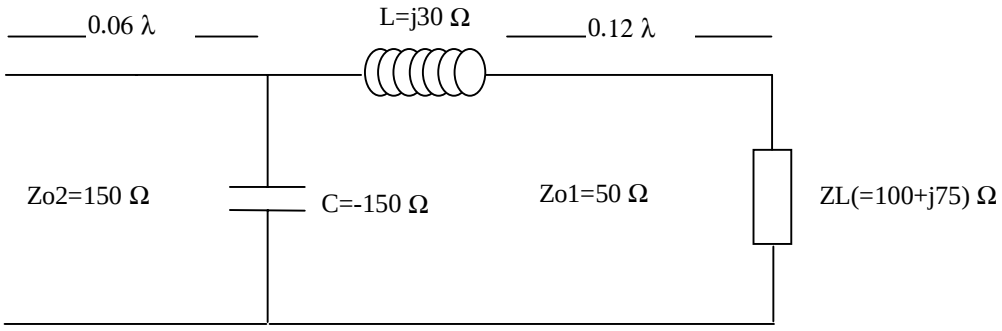
ECE424F MICROWAVES

Homework #3

1) Show that a quarter-wavelength $l = \lambda / 4$ open circuited line behaves like a series resonator. Determine the equivalent series inductance L and capacitance C. The line is assumed lossless with characteristic impedance Z_o and phase velocity V_ϕ.

2) Show that a short section of a high-impedance line ($Z_o = Z_H$) terminated to a resistive load $R_L << Z_H$ behaves like a series inductance L. Determine the equivalent inductance L in terms of the line length l, Z_H and the phase velocity on the line V_ϕ. Likewise, show that a short section of a low-impedance line ($Z_o = Z_L$) terminated to a resistive load $R_L >> Z_L$ behaves like a shunt capacitance C. Determine the equivalent capacitance C in terms of l, Z_L and V_ϕ.

3) Using the Smith chart determine the input impedance of the following circuit:



4) Problem 5.9 in textbook.