1. Prove (3.118) in the text p. 70.

2. Equation (3.116) on page 69 gives the value for $Z_1$ in terms of the even and odd characteristic impedances.
   a.) Find $Z_2$ in terms of the even and odd characteristic impedances.
   b.) Using part a.) derive the expression for $n^2$ in terms of the even and odd characteristic impedances (3.123).

3. A coaxial line filter has the requirement for an impedance inverter of value $K = 17$. If the filter is to operate at a center frequency of 10 GHz and the diameter of the outer conductor of the coaxial line is 7 mm, what are the dimensions of the disk to provide for the K inverter. Do the problem first assuming there is no such thing as discontinuity capacitance. Then rework the problem to accommodate the effects of discontinuity capacitance. The formula for discontinuity capacitance is given by (5.37) on page 119 of the text. You should note that there is no unique solution to this problem. Verify the validity of your solution by showing that it does indeed act as a K inverter. This can be done by plotting the frequency response using SPICE.

   The plots can be done using Super Compact, Libra, ADS (at UTA), or other frequency domain programs. PSPICE can also be used to calculate the S parameters by using the netlist given in the text on RF Circuit Design. Below is a guide.

   Title - Bandpass circuit (first line is always a title)
   * comment lines begin with *
   RS 1 0 50.
   I1 1 0 AC -20M
   E11 10 0 1 0 2
   V11 10 11 AC 1
   R11 11 0 1
   XFILTER 1 2 FIL
   RL 2 0 50
   E21 21 0 2 0 2
   R21 21 0 1
   .AC LIN 201 8GHZ 12GHZ
   *
   .SUBCKT FIL n1 n2
   * Include here the circuit to be analyzed
   .ENDS FIL
   .END