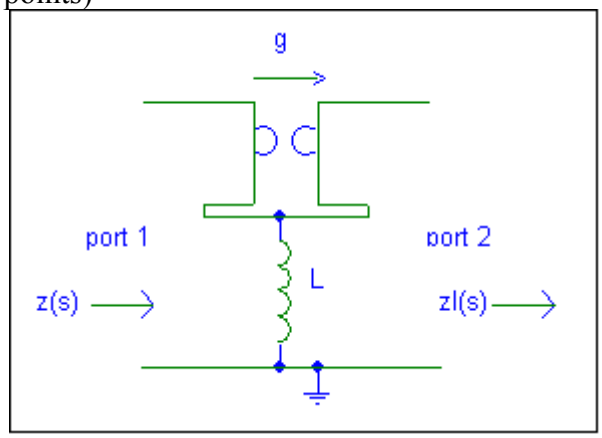
File: E:\courses\fall2007\610\hmwrk3.doc RWN 09/23/07

# ENEE 610
## Homework Problems for Grading, Set 3 (150 points)
## Due at class M 10/01/07
Richards' functions and lossless synthesis

1.(100 points)




a) Find the load impedance, zl(s), versus the input impedance, z(s)=zin(s), and the circuit parameters g and L.
b) Find a Richards' type function, zr(s), in terms of k and z(s) for the above circuit, relate to zl(s) and give g and L in terms of k and z(k).
c) Show that k=1 is a zero of the even part and choose k=1 to synthesize the following two impedances as cascades using the above circuit
   c1) $z(s)=[s(s^2+5)/(s^2+3)]$
   c2) $z(s)=(s^2+3)/[s(s^2+5)]$
d) Repeat c1) using k=2 and again for k=-1
e) Discuss the meaning of the results of this problem – consider passivivity and minimality of the circuits and the differences in circuits for z and y..

2. (50 points)

a) Find the zeros of the even part of the following functions
   a1) f(s)=(s+3)/(s+5)
   a2) f(s)=(s+5)/(s+3)
   a3) f(s)=s(s+3)/(s+5)
   a4) $f(s)=(s^2+s+1]/(s^2+2s+1)$
   a5) $f(s)=(s^2-2s+1]/(s^2+2s+1)$

b) Synthesize the admittance y(s)=(s+3)/(s+5) using k as a zero of the even part and the Richards' type function of problem 1 above.