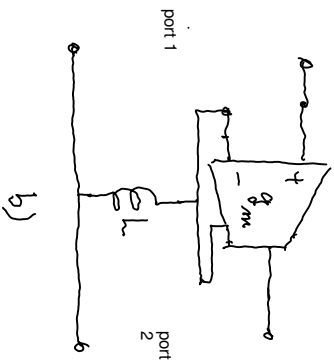
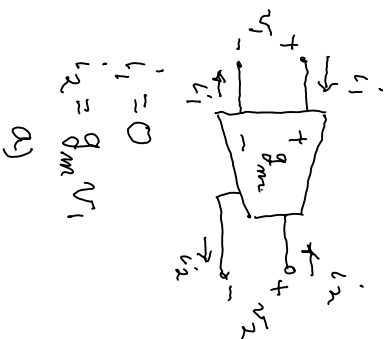


ENEE 610 Fall 2019 Homework 4 Due Tu 10/01/19

#1 (50 points; scattering matrix)

For the following circuit

- a) Give the 2-port A(s) (V=B(s)) description of the circuit of b) using the OTA of a).
- b) Give the scattering matrix for reference impedance $R = r_{12}$ and for the case $r=1$
- c) Interpret the s_{21} in both cases including the position of poles and zeroes.
- d) When $r=1$ for what g_m and L is s_{11} bounded-real



#2 (50 points, bilateral-Laplace transform).

- a) Find the inverses, $f(t)$, of the bilateral Laplace transform $F(s) = \frac{s^2 - as + b}{(s+a)(s^2 + as + b)}$ for real non-negative a and positive b . Do this for all possible regions of convergence in the complex variable s -plane.
- b) When $s = j\omega$ the bilateral Laplace transform is the Fourier transform. When $a > 0$ give the magnitude and phase for $s = j\omega$ and discuss what this means about the region of convergence.
- c) If $U(s)$ is an input with $Y(s) = F(s)U(s)$ give the possible outputs $y(t)$ when $a = 0$ and $u(t)$ is the unit step function, $u(t) =$