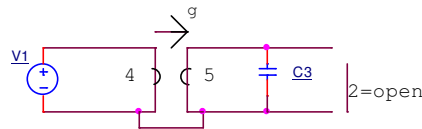


ENEE 610 Fall 2016 – Homework 3 Due Th 09/29/16

1. (45 points, Sensitivity)

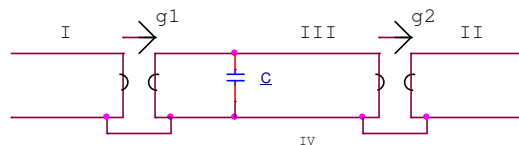
For the following circuit it is desired to find the sensitivity of the transfer function $v_2/v_1(s)$ to the capacitor C_3 as well as to the gyration conductance g . Draw the adjoint circuit with its terminations.

- Draw the adjoint circuit with its terminations
- Give the formulas needed to find the derivatives needed in these sensitivity calculations.
- Give the resulting sensitivities by analysis of the two circuits.
- Check by direct calculations of the transfer function.



2. (40 points, indefinite Y, loaded Z)

- Find the indefinite admittance (4x4) matrix using the indicated node numbers.
- Ground node IV and eliminate node III and from the result get the 2-port impedance matrix, $Z(s)$.
- Terminate port 2 in an impedance $z_l(s)$ and give the resulting input impedance $z_i(s)$.



3. (15 points, loaded circulators)

For the following case of loaded circulators, all normalized to $z_0=1$ with circulation counter clockwise , give the input scattering matrix (here a scalar so actually the reflection coefficient). Explain any anomaly.

