EE213 Exam 1

March 12, 2014

Closed Book, Justify all work unless otherwise instructed.

Good Luck

NAME_____

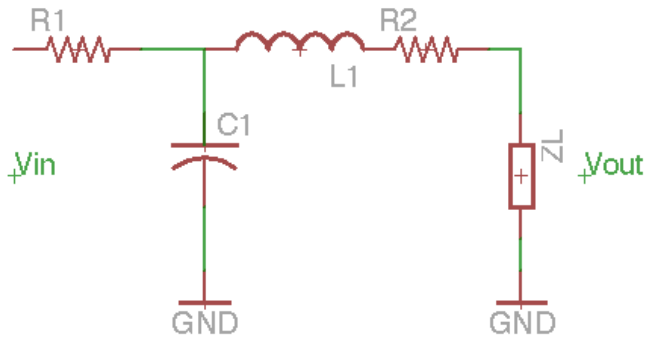
student ID number _____

1	**/25**
2	**/25**
3	**/25**
4	**/25**
TOTAL	**/100**

1) (25) Consider the following circuit with $R_1 = 10\Omega$, $R_2 = 10\Omega$, $C_1 = 10mF$, and $L_1 = 1H$, and input voltage $v_{in}(t) = 10\cos(10t)$.

a) Find the Thevenin equivalent circuit (Thevenin voltage and impedence, do not include Z_L) for the circuit output $v_{out}(t)$.

b) Determine the impedence Z_L at output $v_{out}(t)$ that will result in maximal average power deliver to Z_L. Determine this maximum average power delivered to Z_L.

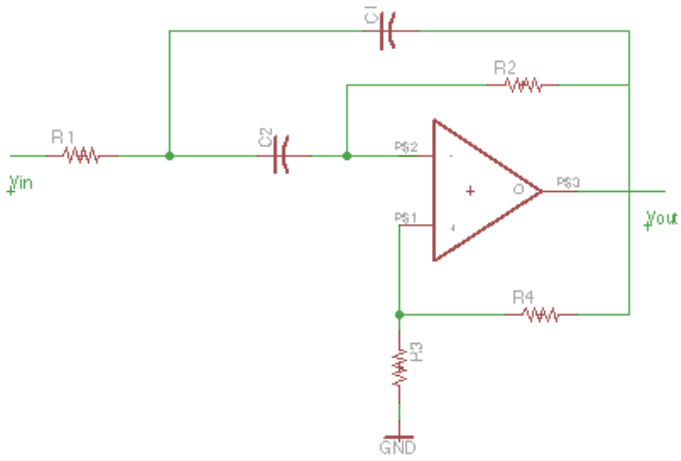


2) (25) Consider the circuit below.

a) Let $R_3 = R_4$. What is the voltage at the positive input of the opamp?

b) Assuming a), write two nodal equations by hand.

c) From b) find the transfer function $H(s) = V_{out}(s)/V_{in}(s)$ by hand.

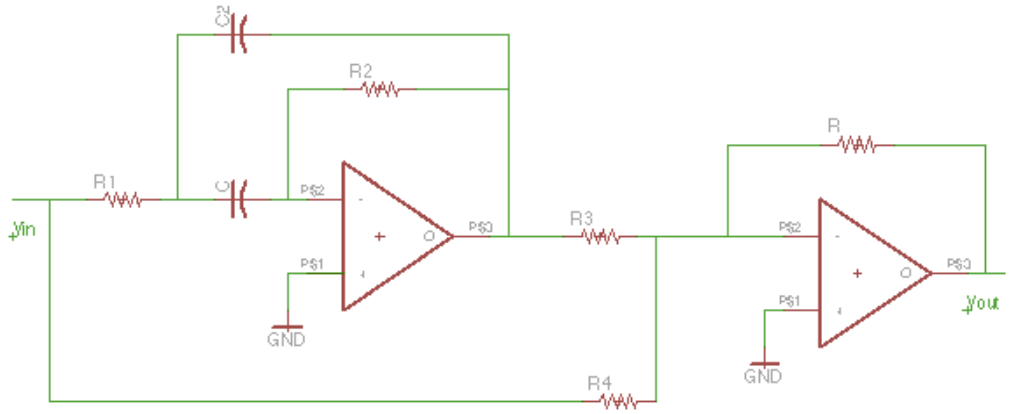


3) (25) Consider the circuit below.

a) Write MATLAB code to determine the transfer function $H(s) = V_{OUT}(s)/V_{IN}(s)$. Do not solve for the transfer function.

b) Write matlab code to find the zero state response.

c) Determine the value of the transfer function $H(s)$ at very high and very low frequencies from physical arguments.



4) (25) Consider a circuit that has the following transfer function.

$$H(s) = \frac{2s+3}{s+4}$$

a) Find the impulse response, $h(t)$

b) Find the step response $s(t)$.

c) If the input to the circuit is $x(t) = 10\cos(2t - \pi/4)$, find the output $y(t)$ assuming the above transfer function.