EE230   Name__Aash Agarwal__   Sec__A__
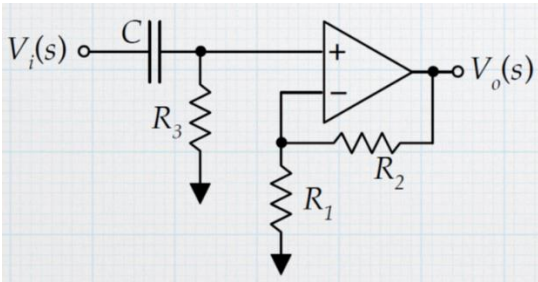
HW 4 (*Filter analysis*)
Due: October 04, 2017

You can put your work and answers directly on these sheets. If you need extra pages in order to show all your work, be sure to attach those also. Be sure to include your supporting work!

1. Find the transfer function of the circuit shown below

(1) $T(s) = \dfrac{V_o(s)}{V_i(s)} = G_0 \dfrac{s}{s + \omega_0} = \dfrac{R_1 R_3 s^2 + R_2 R_3 sC}{R_1 R_3 sC + R_1 s}$
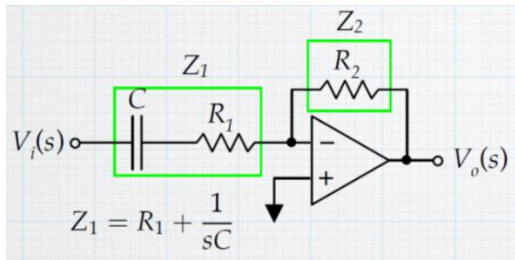
(2) What type of filter is this?

    1st order high pass filter

(3) Calculate ω_0 and G_0 for the filter.

$\omega_0 = \dfrac{1}{R_3 C}$; $G_0 = \dfrac{1 + \dfrac{R_2}{R_1}}{}$

2. Find the transfer function of the circuit shown below

$Z_1 = R_1 + \dfrac{1}{sC}$

(1) $T(s) = \dfrac{V_0(s)}{V_i(s)} = \dfrac{-Z_2}{Z_1} = \dfrac{-R_2}{R_1 + \dfrac{1}{sC}} = \dfrac{G_0 s}{s + w_0}$
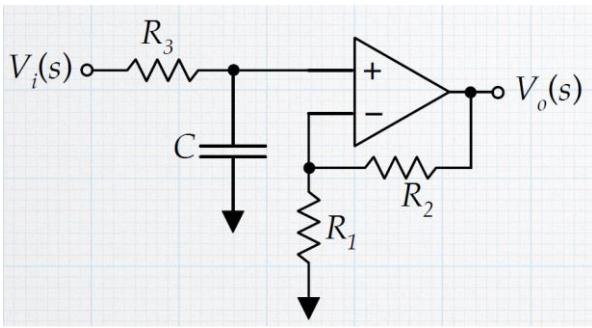
(2) What type of filter is this?

1st order Active high pass filter

(3) Calculate ω_0 and G_0 for the filter.

$\omega_0 = \dfrac{1}{R_1 C}$; $G_0 = \dfrac{-R_2}{R_1}$

3. Calculate the transfer function for the circuit shown below.

(1) $T(s) = \dfrac{V_o(s)}{V_i(s)} = G_0 \dfrac{W_0}{s + W_0} = \dfrac{R_1 R_3 C + R_2 R_3 C}{s R_1 R_3 C + R_1}$

(2) What type of filter is this?

1st order low pass filter

(3) Calculate ω_0 and G_0 for the filter.

$\omega_0 = \dfrac{1}{R_3 C}$; $G_0 = \dfrac{1 + R_2}{R_1}$