Homework 2 Mary Mikeon 2/1/18

3.2, 3.4

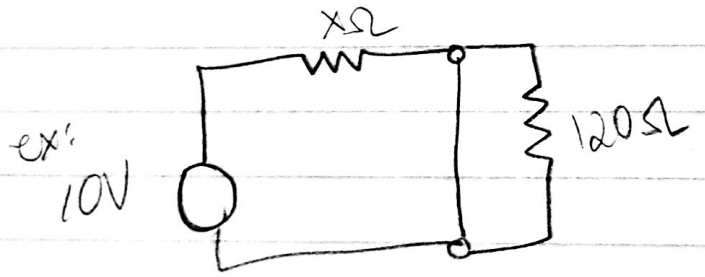
3.2) $G = 60dB$ $V_i = 3mV$ $V_o = ?$

$$G_{DB} = 20 \log_{10}\left(\frac{V_o}{V_i}\right)$$

$$\frac{60}{20} = \log_{10}\left(\frac{V_o}{.003}\right)$$

$$V_o = .003 \cdot 10^3 = 3\,V$$

3.4) $R_o = 120\Omega$ min R_i for load error $< 1\%$



$$L_{ERROR} = V_{before} - V_{after}$$

$$.01 \cdot 10 = .1\,V \text{ diff}$$

$$V_{before} = 10 \qquad V_{After} = \frac{120}{120+X}(10)$$

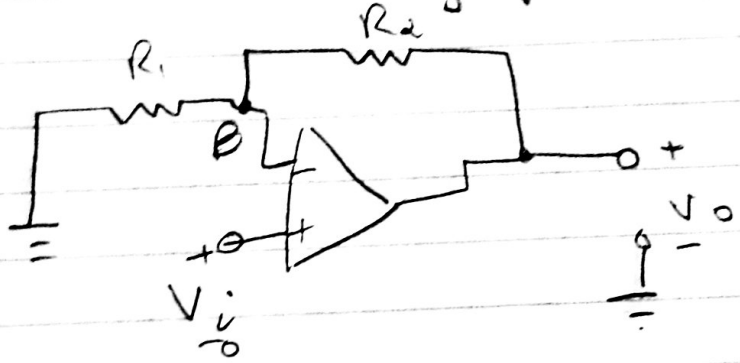
$$.1 = 10 - \frac{10}{\frac{1120}{12}} - \frac{1200}{X}$$

$$.1 = -\frac{1200}{X}$$

$$R_i = 12{,}000\,\Omega$$

3) a) phase change as a function of frequency
- linear
b) common mode rejection ratio
- infinite
c) input resistance
- infinite
d) output resistance
- 0

4) 3.11 figure: derive $\frac{V_o}{V_i}$ for non-inverting op-amp



$B = V_i \qquad I_1 = \frac{V_i}{R_1} \qquad I_1 = \frac{V_o - V_i}{R_2}$

$$\frac{V_i}{R_1} = \frac{V_o - V_i}{R_2}$$

$$\left(\frac{R_2}{R_1}\right) V_i = V_o - V_i$$

$$V_o = V_i \left(1 + \frac{R_2}{R_1}\right)$$

$$\frac{V_o}{V_i} = 1 + \frac{R_2}{R_1}$$