EE3002: Analog circuits

EE5310: Analog electronic circuits

Problem Set #5

1.

$$C$$

$$20\mu S, 0.2\mu S$$

$$10fF$$

$$80\mu S, 0.8\mu S$$

$$40fF$$
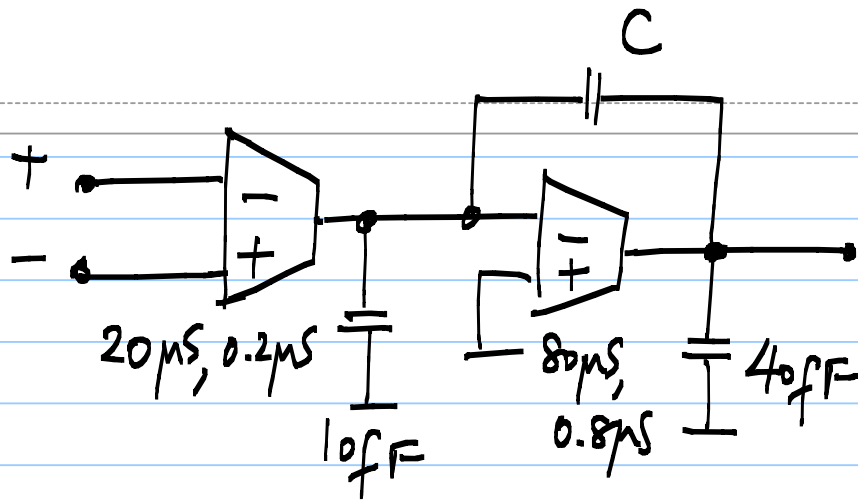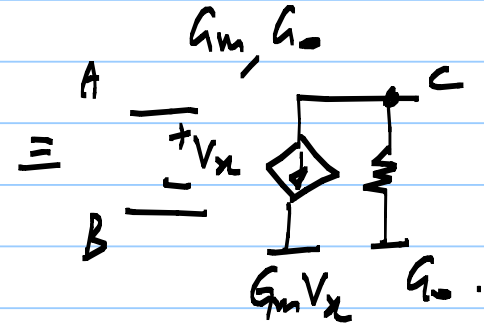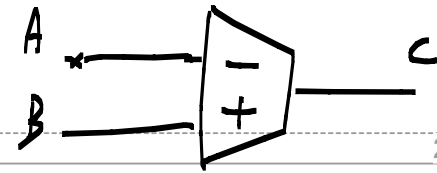
TWO STAGE OPAMP

The two stage opamp above is used in the unity gain follower on the right. Determine C for 60° phase margin and the resulting bandwidth of the unity gain buffer.

$$A \quad C$$
$$B$$

$$G_m, G_o$$

$$A \quad \equiv \quad +V_x \quad C$$
$$B \quad G_m V_x \quad G_o$$

$$V_i \qquad V_o$$

$$R_L = \frac{1}{7.2\mu S}$$

$$1pF$$

$$R_L$$
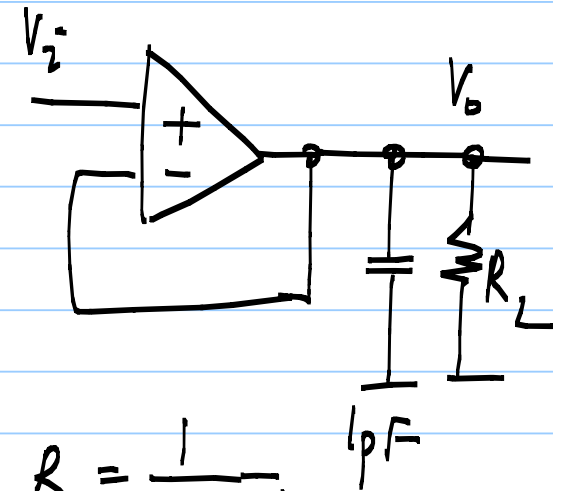
2. The two stage opamp above is used (as is) in the 2x amplifier on the right. What is the phase margin of the loop and the closed loop bandwidth of the amplifier?

V_i

V_o

$$\frac{R_L}{2}$$

$$R_L = \frac{1}{7.2\mu s}$$

$$\frac{R_L}{2}$$

$1pf$
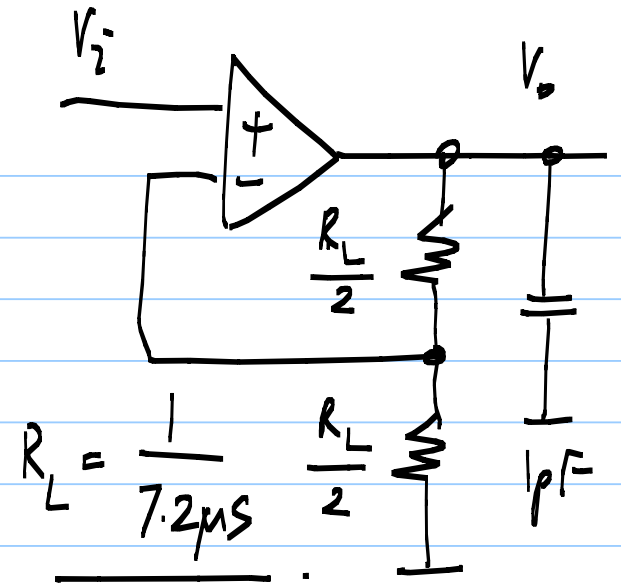
3. If you are allowed to change "C" in the opamp in the above problem, what value would you use to get $60°$ phase margin? What is the bandwidth of the 2x amplifier in this case?

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12.5kΩ C

$20\mu S, 0.2\mu S$

10fF

$80\mu S,$
$0.8\mu S$

40fF
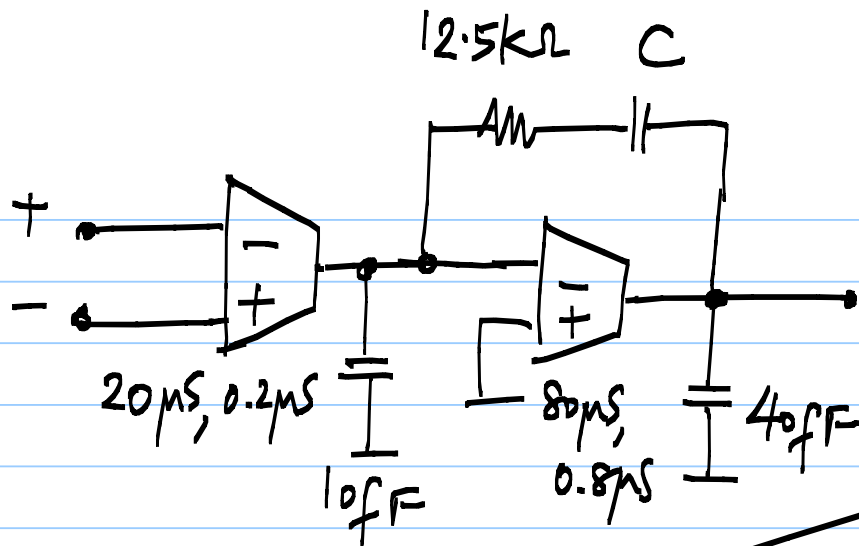
Analyze this !

A zero cancelling resistor is used in series with the integrating capacitor. Repeat prob #1 for this case.

5. Repeat Prob #3 with the opamp above

6. In each of the above cases, you would have used some approximations. In each case, with the value of "C" that you used, determine the exact closed loop transfer function and determine the closed loop poles and zeros. You can use a numerical solver to determine these if necessary.