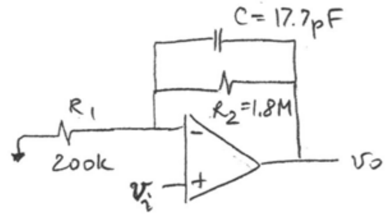
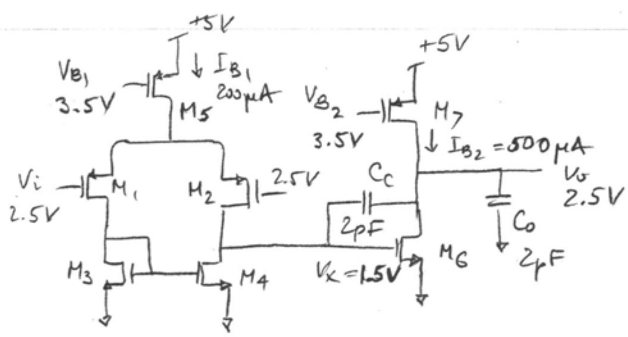
(1) For the following circuit



(a) sketch the frequency response showing the low-frequency gain, the high-frequency gain, any poles and zeros, and slopes

(b) if the unity GBW of the opamp is 10MHz, what is the gain error and the corrected gain of v_o/v_i at 200kHz?

(2) For the opamp shown



$K_p = 25\mu A/V^2$

$\mu_n = 50\ \mu A/V^2$

$V_{Tn} = 0.5V$

$V_{THp} = -0.5V$

$\lambda_p = 0 \quad \lambda_n = 0.05$

$\gamma_p = 0 \quad \gamma_n = 0$

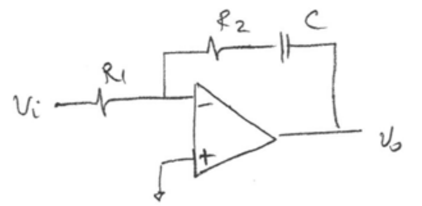
(a) With an opamp having a circuit as shown, and bias currents and other parameters as specified, pick and specify any transistor sizes to establish an internal bias voltage level V_x of 1.5V as shown and an output bias of 2.5V.

(b) determine the DC magnitude gain of the two stages (v_x/v_i, v_o/v_x) and the overall DC gain in dB

(c) calculate the pole and zero frequencies and the unity GBW of the opamp in Hz. Determine if the opamp is stable. Explain your reasoning.

(d) Find the positive and negative common-mode input range.

(3.) For the circuit shown



$R_1 = 1M\Omega$

$R_2 = 2M\Omega$

$C = 5pF$

(a) Find the tranfer functions relating the noise due to R_1 and R_2 to the output

(b) Calculate the power spectral density at the output due to R_1 and R_2 at 100 kHz

(c) Find the integrated output noise due to R_2 up to a bandwidth of 1MHz.

(d) The opamp has input referred thermal noise voltage v_n of $20\ nV/\sqrt{Hz}$. Sketch the output noise density due to v_n from 1kHz to 1 MHz.