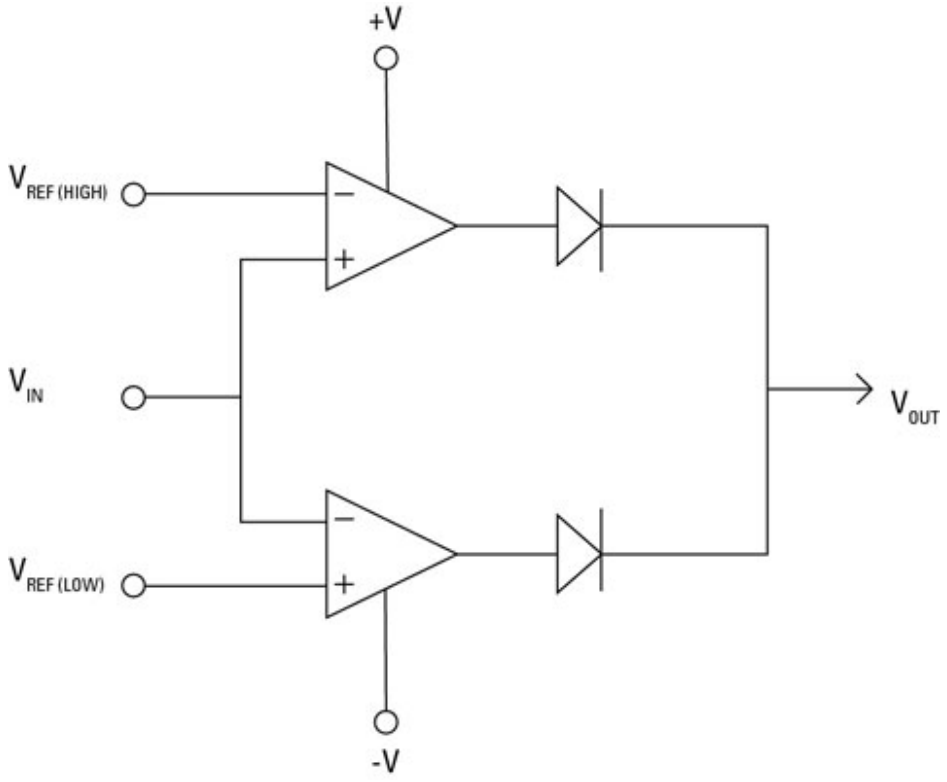
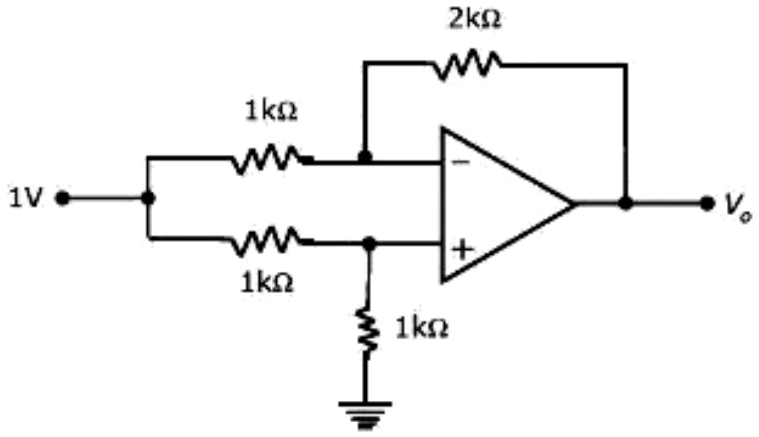
PH3104 Problem Set 10

Q 1) Describe the way in which the circuit below works.

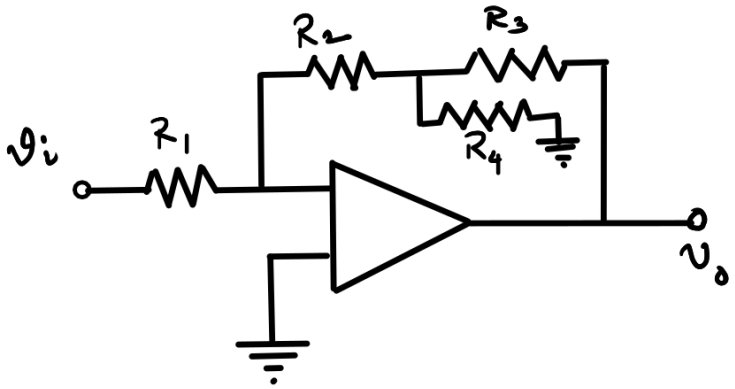


Q 2) Determine the voltage V_o in the circuit below



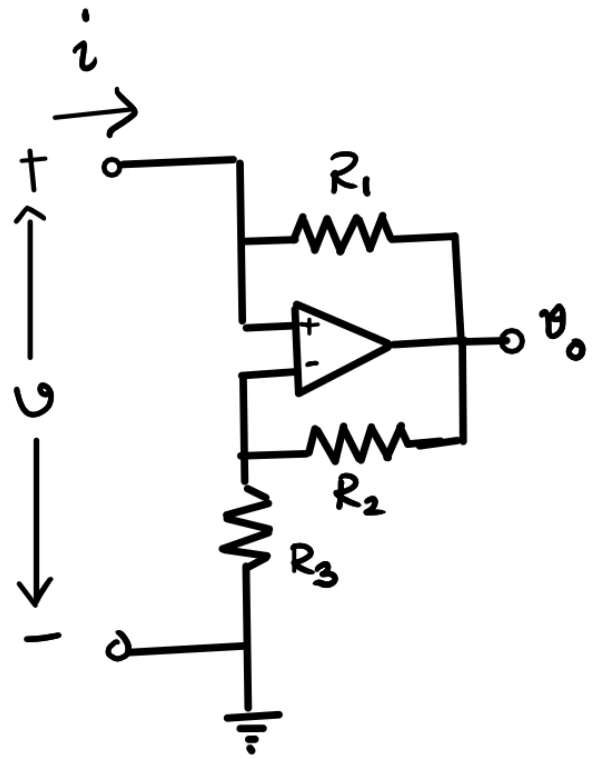
Repeat your calculation for an arbitrary input voltage V_i and with four arbitrary resistors R_1, R_2,R_3 and R_4.

Q 3) Determine the voltage gain of the OP-AMP circuit shown below.



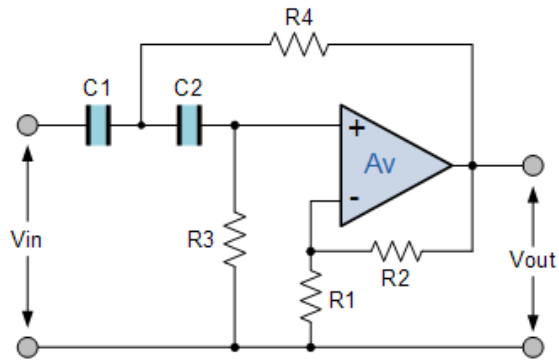
Can you explain why this circuit can be considered to be an improvement over the standard OP-AMP inverting amplifier?

Q 4) Deduce the output of the circuit below as the input voltage Vvaries from $-V_{\text{sat}}$ to $+V_{\text{sat}}$. Determine, too, the input current i as a function of the voltage V (over the same range).

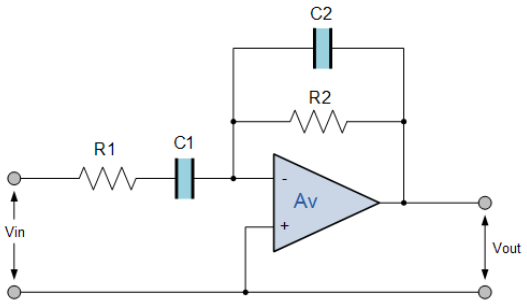


Taking $R_1 = R_2 = R_3 = 1$ k and $V_{\text{sat}} = 12$ V,plot graphs of v_o versus v, and i versus v.

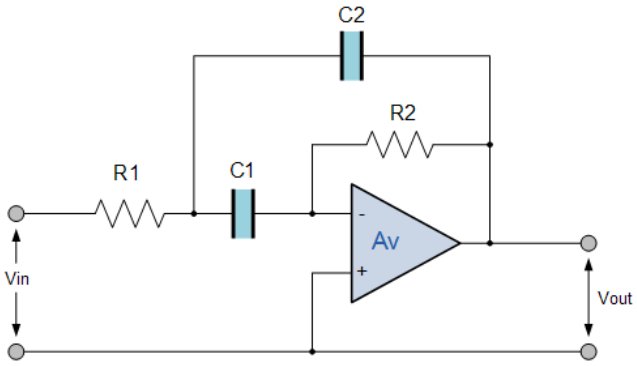
Q 5) Determine the frequency response for the filter circuit shown below



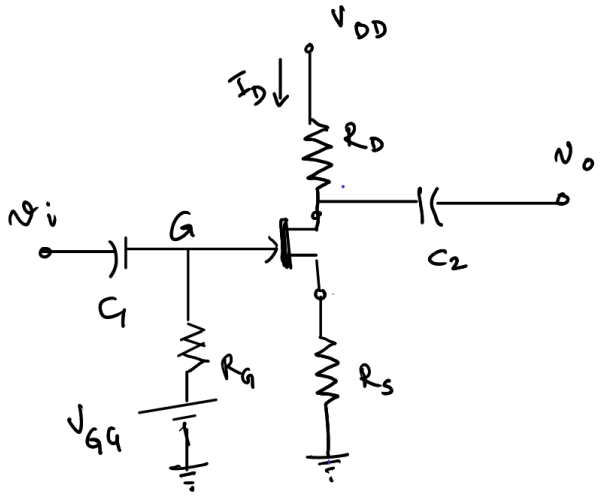
Q 6) Determine the mid-band voltage gain, upper and lower cut-off frequencies of the circuit below:



Q 7) Determine the Q-factor of the filter circuit below:



Q 8) Determine the input impedance, output impedance and voltage gain of a common-source self bias JFET circuit where the resistor R_S is unbypassed.



Use the small signal equivalent model of the JFET - and DO NOT ignore r_d.