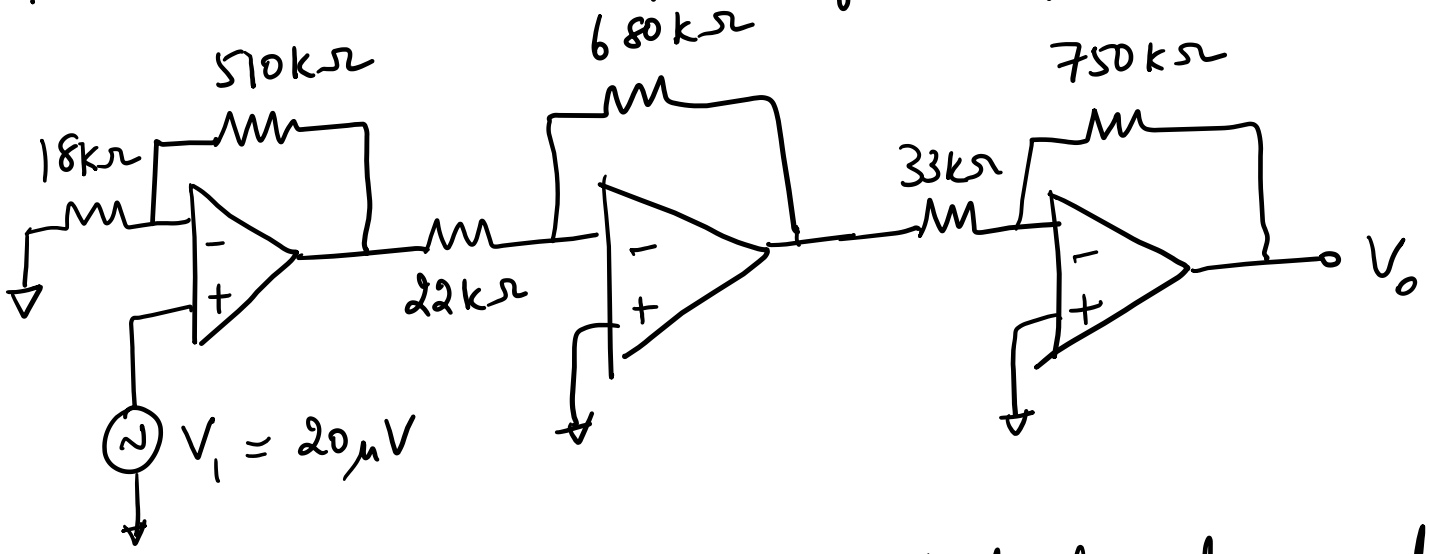
Basic Electrical and Electronics Engineering

Practice Problems on Opamps

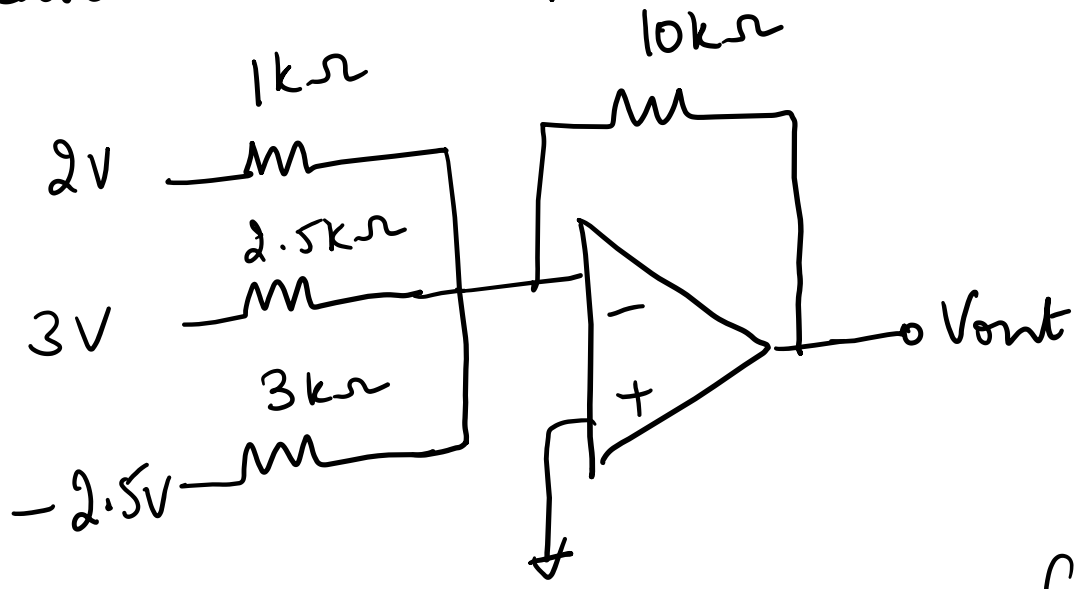
1. Calculate the output of the following circuit



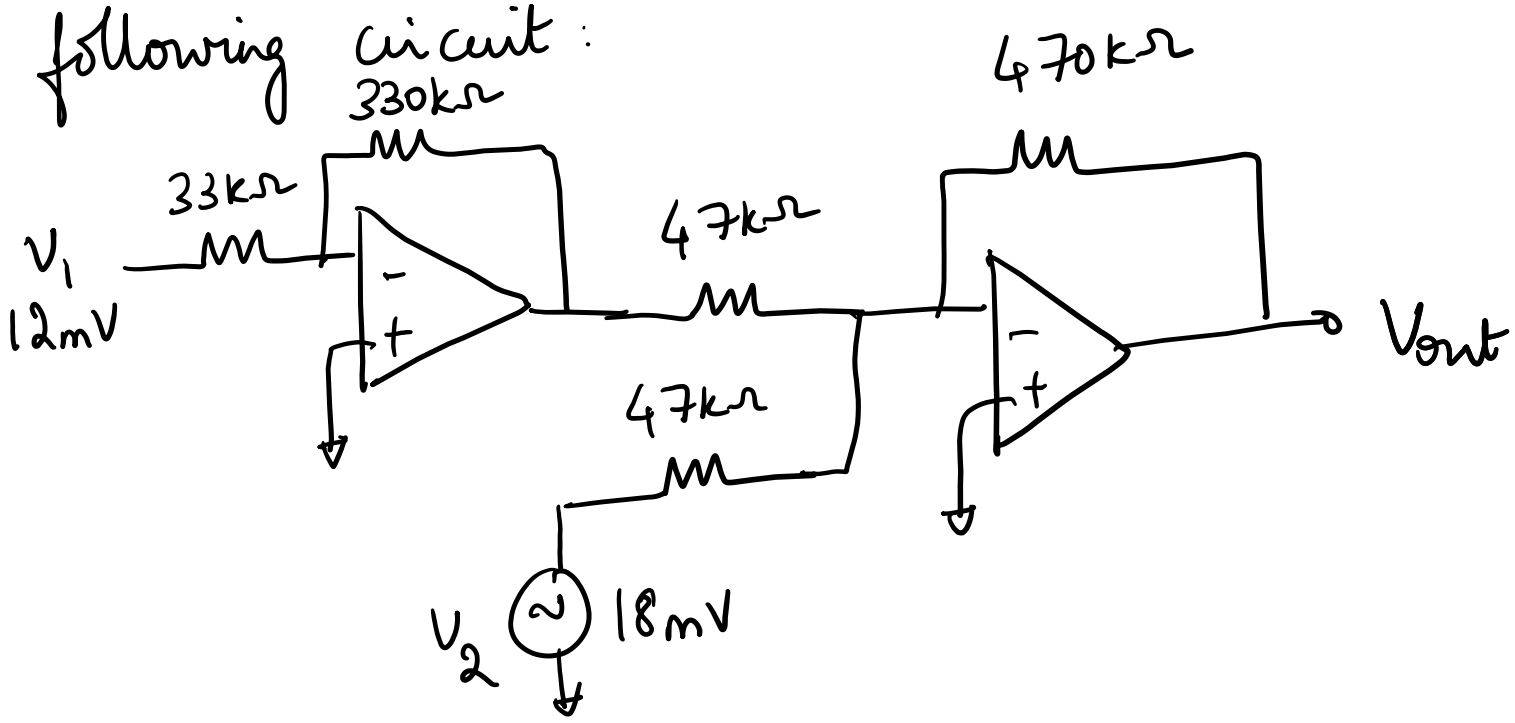
2. An amplifier is required to be designed with a gain of 20 V/V. The output has to be in-phase with the input. All resistor values need to be $> 1K\Omega$ & $< 100K\Omega$. Design the amplifier using opamps.

3. Implement $V_{out} = 8V_1 - 3V_2 - 6V_3$ using opamps. You cannot assume the availability of negative voltage inputs

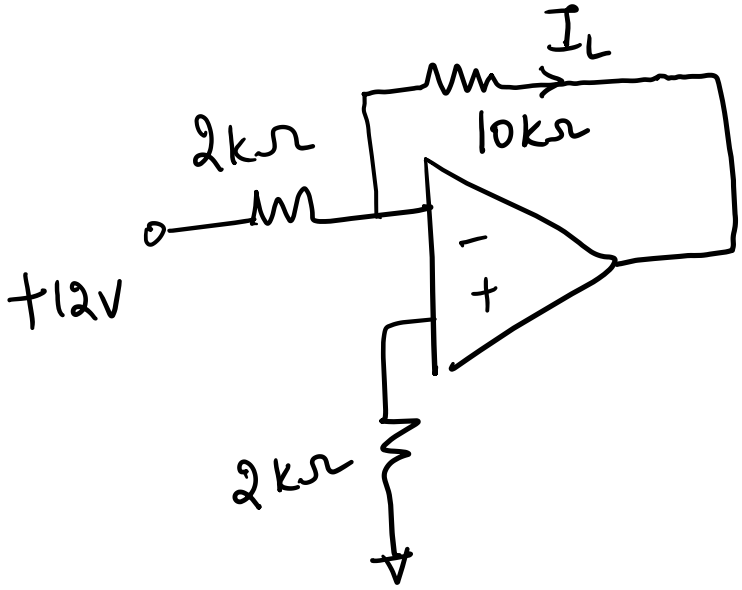
4. Calculate the output voltage



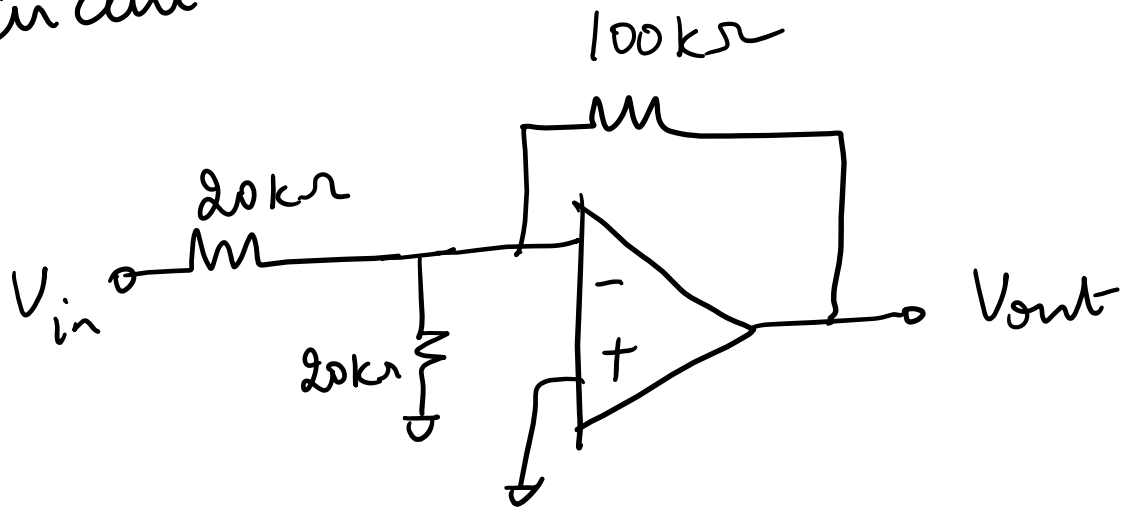
5. Determine the output voltage for the following circuit:

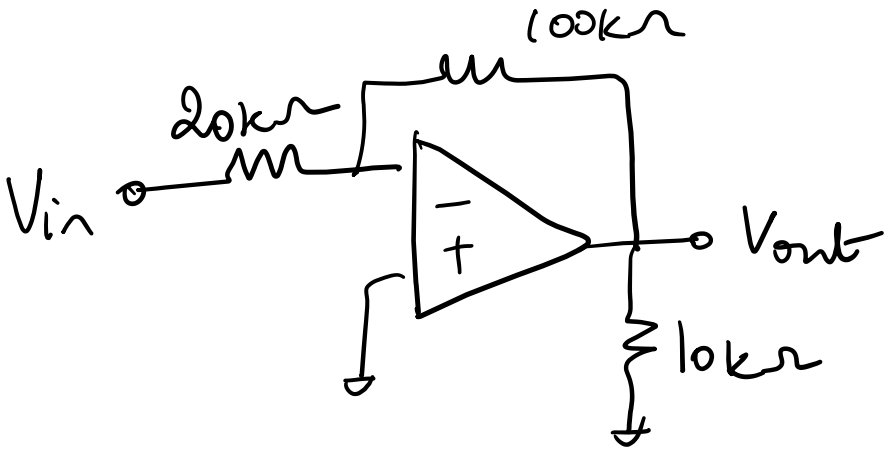


6. Calculate I_L for the following circuit:



7. Calculate voltage gain for the following circuit:

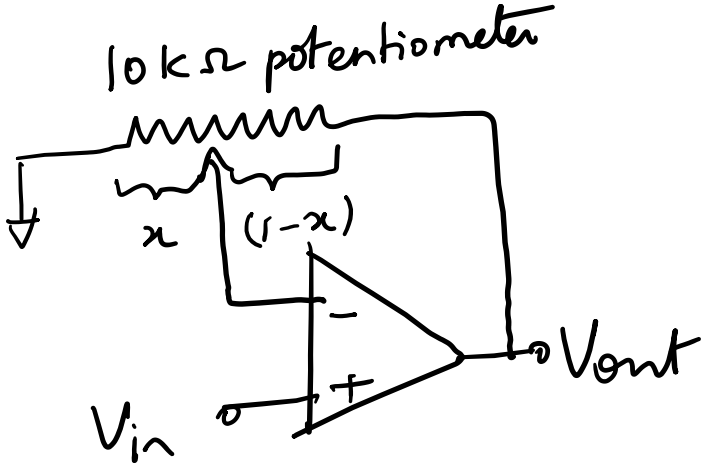




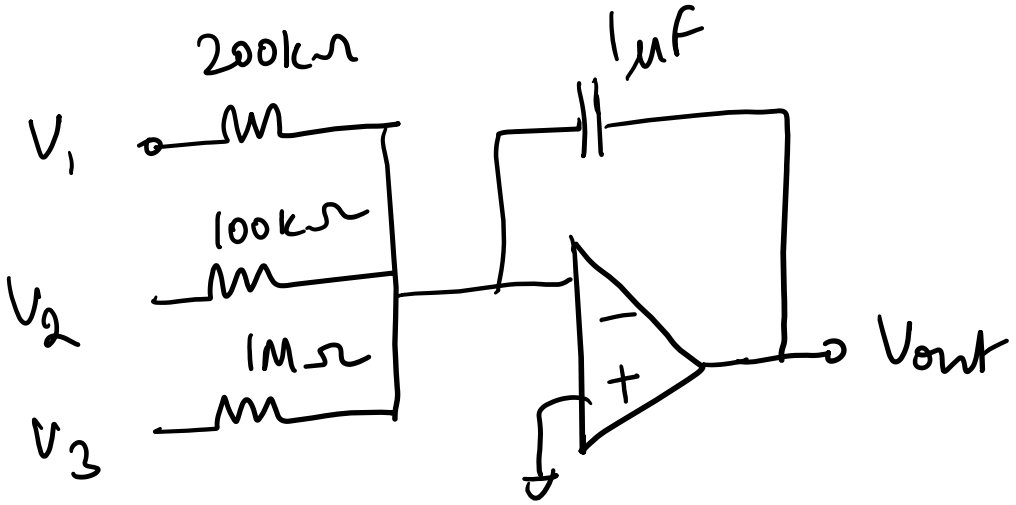
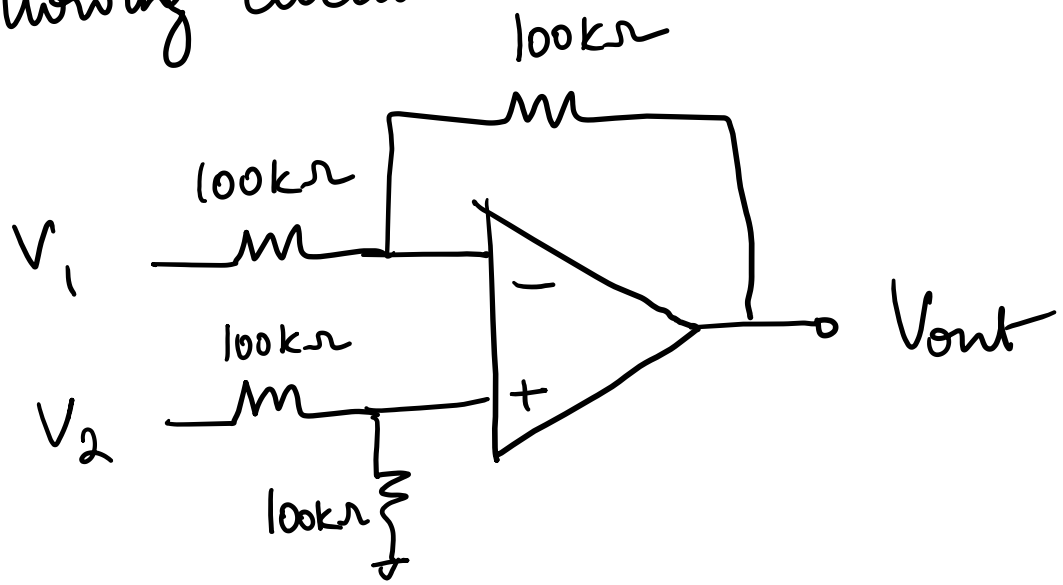
8. Use 2 opamps to implement the function $V_{out} = V_1 + 2V_2 - 3V_3 - 5V_4$

All inputs are positive only.

9. The circuit below uses a 10kΩ potentiometer to realize an adjustable gain amplifier. Derive an expression for the gain as a function of 'x'. What is the range of gains obtained? Show how to add a fixed resistor so that the gain range can be 1V/V to 11 V/V. What should the resistor value be?



10. What is the $V_{out}(t)$ for the following circuit?



11. Derive the expression for Vout in the following circuit: