Q1:   For the circuit shown below, find v_0 and current through the 3V source (assume the OPAMP to be ideal)
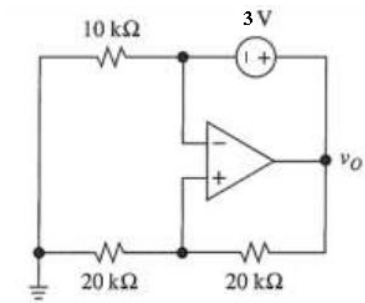

Q2:   The circuit shown below uses a 10 kΩ potentiometer to realize an adjustable gain amplifier. Assume the op-amp to be ideal. Derive an expression for the gain of the amplifier as a function of the potentiometer setting 'x'. What is the range of gain obtained? Show how to add a fixed resistor so that the gain range gets limited to $1 - 21$ V/V. What should be the resistor value be?
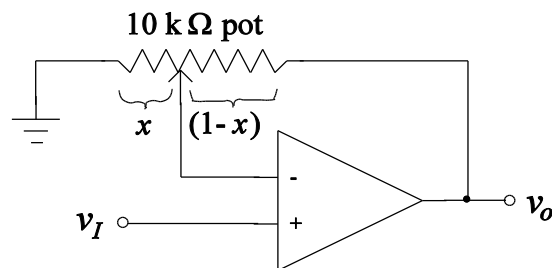
Q3:   For the circuit shown below, sketch the output voltage and find the number of input pulses for which the output voltage reaches a value of -5V. Assume the OPAMP to be ideal, the initial voltage across the capacitor is 0 V and the switch is opened at t=0, and kept opened thereafter. (Assume that the capacitor does not discharge when the applied input becomes zero)
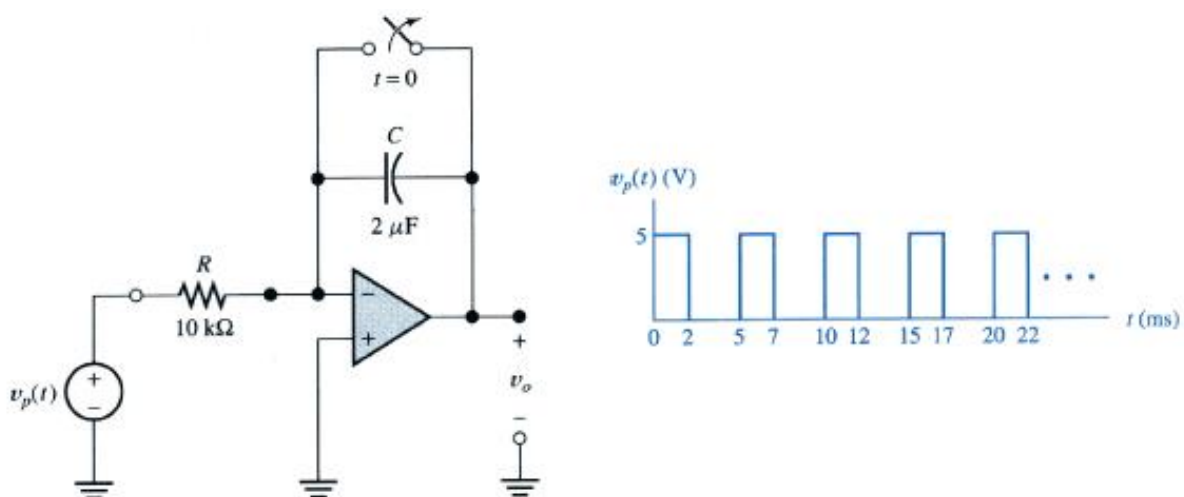
Q4:   Find the binary, octal and hexadecimal equivalent of 182.8125_{10} .