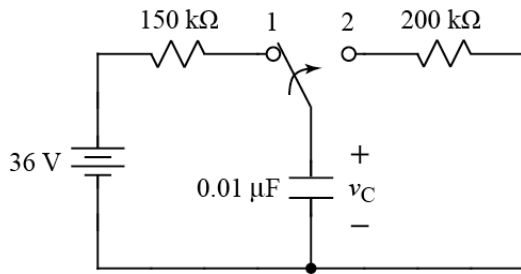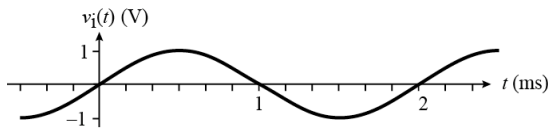1.

After being on side 1 for a long time, the switch moves from side 1 to side 2 at $t = 0$.

a) Find the value of $v_C(t = 0)$.

b) Find an expression for $v_C(t > 0)$.

c) Find the value of the energy stored by the capacitor at time $t = 3\tau$ where $\tau =$ time constant for circuit after $t = 0$.
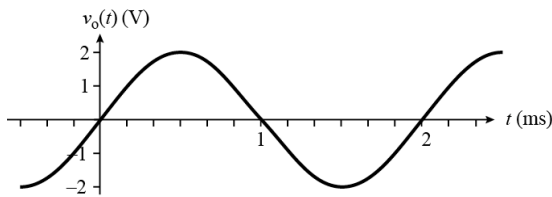
2.

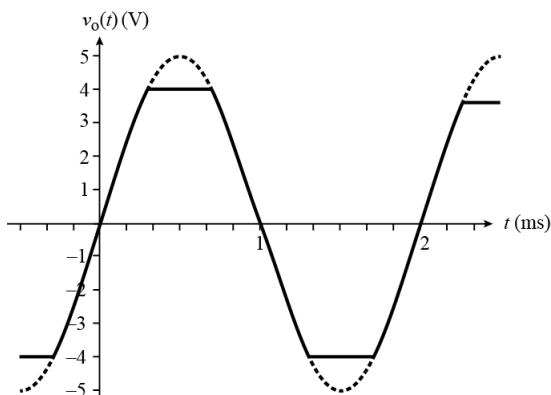A function generator outputs the following signal, $v_i(t)$.

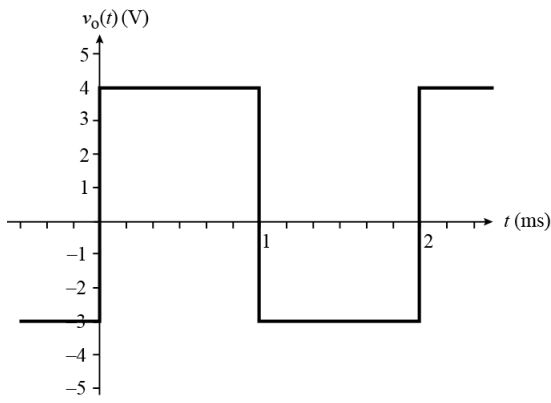Design op-amp circuits to output each of the following waveforms when $v_i(t)$ is the input. You may use either one or two op-amps in each case.
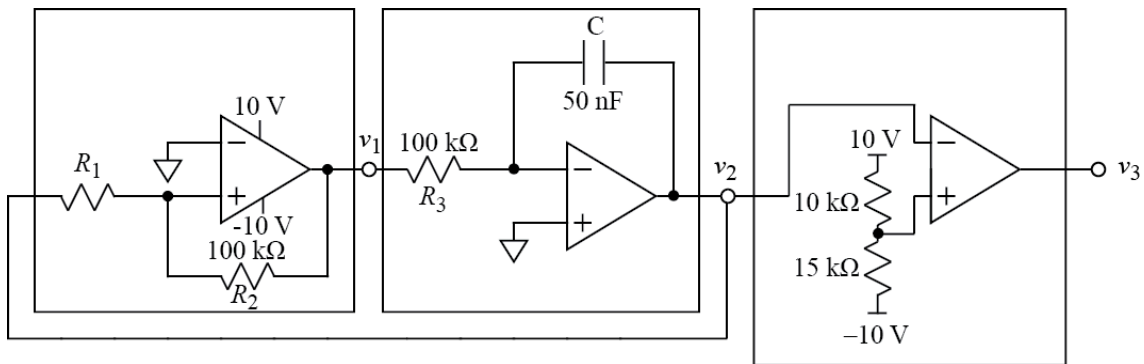

a)

b)

$v_o(t)$ (V)

c)

3.

The above circuit is from Lab 4, but some of the component values have been changed.

a) Find the minimum and maximum values allowed for R_1 in order to achieve proper operation: 1) successfully generating a triangle wave (which requires that v_1 switches from high to low and back), and 2) avoiding clipping that would occur if v_2 exceeded the rail voltage for the op-amp.

b) Choose an allowed value for R_1 and calculate the period of $v_2(t)$.

c) Draw a graph of $v_2(t)$ and $v_3(t)$ for at least one period of $v_2(t)$. Label all important times and voltages on the graph.