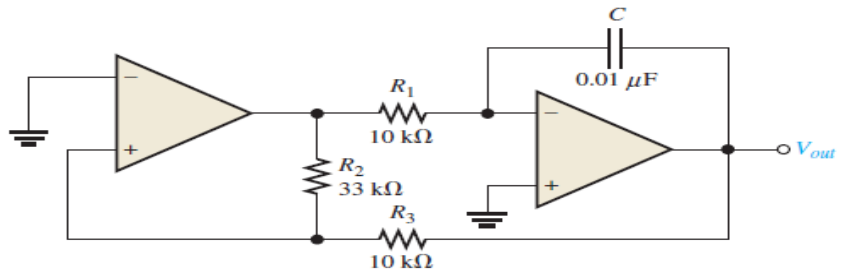
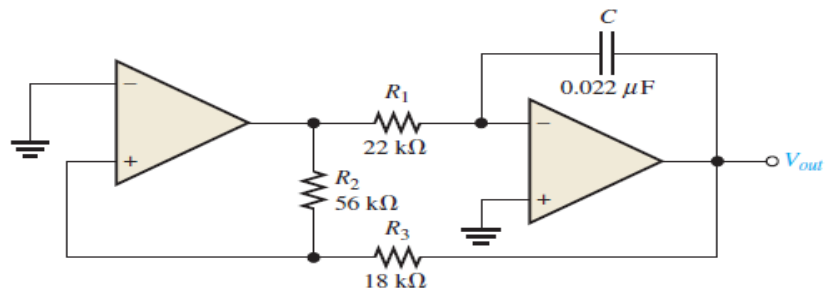




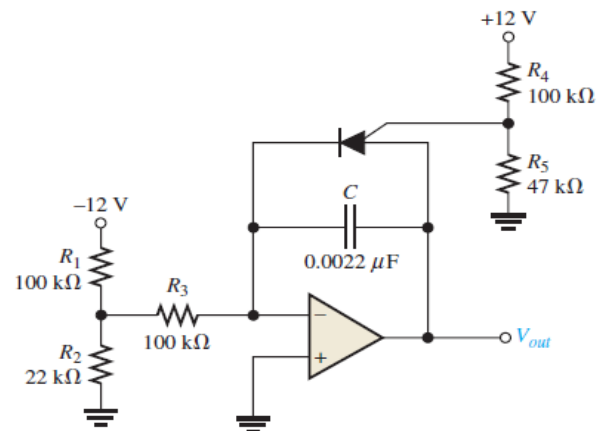
1. Determine the frequency of oscillation of the circuit in Figure; to what value must R_1 be changed to make the frequency 20 kHz?



2. What type of signal does the circuit in Figure produce? Determine the frequency of the output.
 Show how to change the frequency of oscillation to 10 kHz.

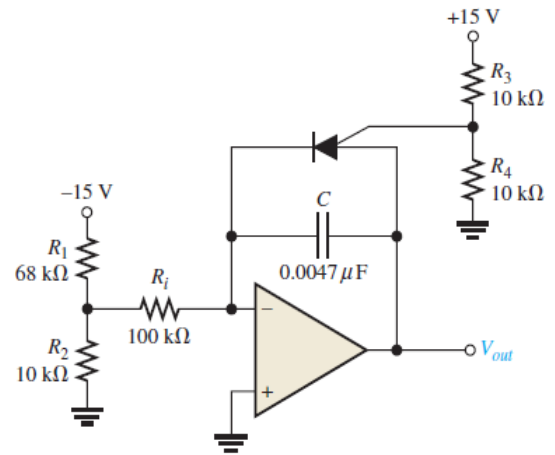


3. Determine the amplitude and frequency of the output voltage in Figure.
 Use 1 V as the forward PUT voltage.
 Modify the sawtooth generator so that its peak-to-peak output is 4 V

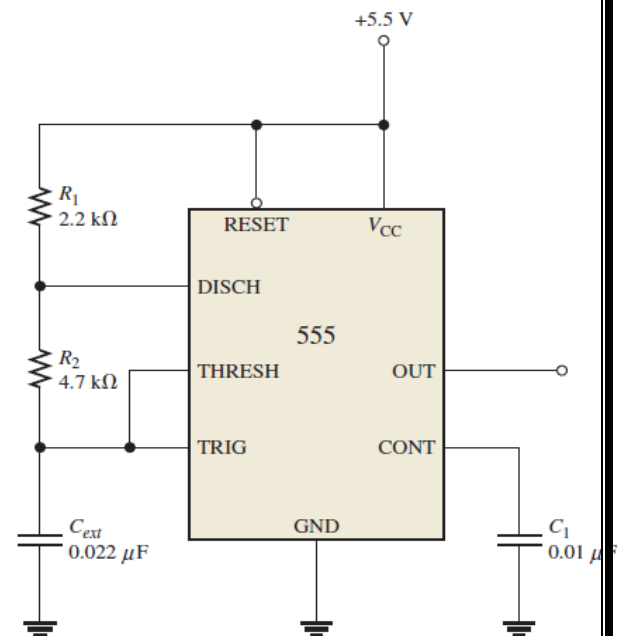


4. (a) Find the amplitude and frequency of the sawtooth output in Figure, Assume that the forward PUT voltage, V_F is approximately 1 V.

(b) Sketch the output waveform.



5. A 555 timer configured to run in the astable mode (oscillator) is shown in Figure; determine the frequency of the output and the duty cycle.



6. Determine the frequency of oscillation for the 555 astable oscillator in Figure To what value C_{ext} must be changed to achieve a frequency of 25 kHz?

In an astable 555 configuration, the external resistor $R_1 = 3.3 \text{ k}\Omega$, what must R_2 equal to produce a duty cycle of 75 percent?

And show How to produce a VCO output using this circuit.

