EE 100 Lab 3
Pre-Lab: RC Circuits

Name: _____
TA: _____Section: _____

Please read the lab manual first then show your work here.

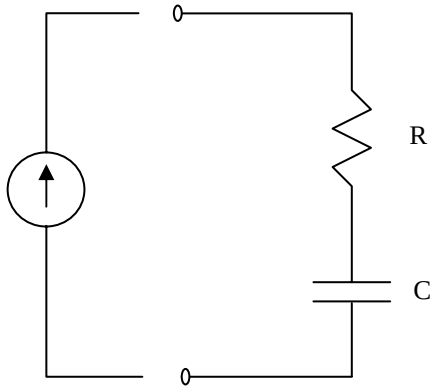
$$V = Q/C = [\int i(t)dt] / C$$

Differentiating this equation, we obtain $i(t) = C(dV/dt)$

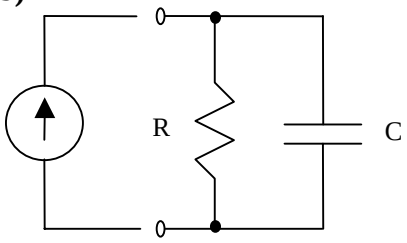
1. If a constant current of 1.0 mA were to flow into a 200 μF (microfarad) capacitor, what would be the voltage across the capacitor after 3 seconds?

2. Describe what would happen theoretically if you were to connect an ideal current source to the following circuits. Use time plots to illustrate.

a)



b)



3. An RC (resistor + capacitor) circuit will have an exponential voltage response of the form $v(t) = A + B\, e^{-t/RC}$ where A and B are constants that express the final voltage and the difference between the initial voltage and the final voltage, respectively.

a. Given R = 10 kΩ and C = 0.1 μF, a starting voltage of 5 volts and an ending voltage of 0 volts, what will the voltage be at t = 1 ms?

b. At what time will the voltage be 0.5 volts?

4. Suppose you were given two black boxes that contain either a series or parallel combination of R and C. In the case of the series RC, you would not be able to touch a probe between the R and the C in the black box, so how would you go about determining R and C using the signal generator, the oscilloscope and an external resistance? (Hint: read the lab)