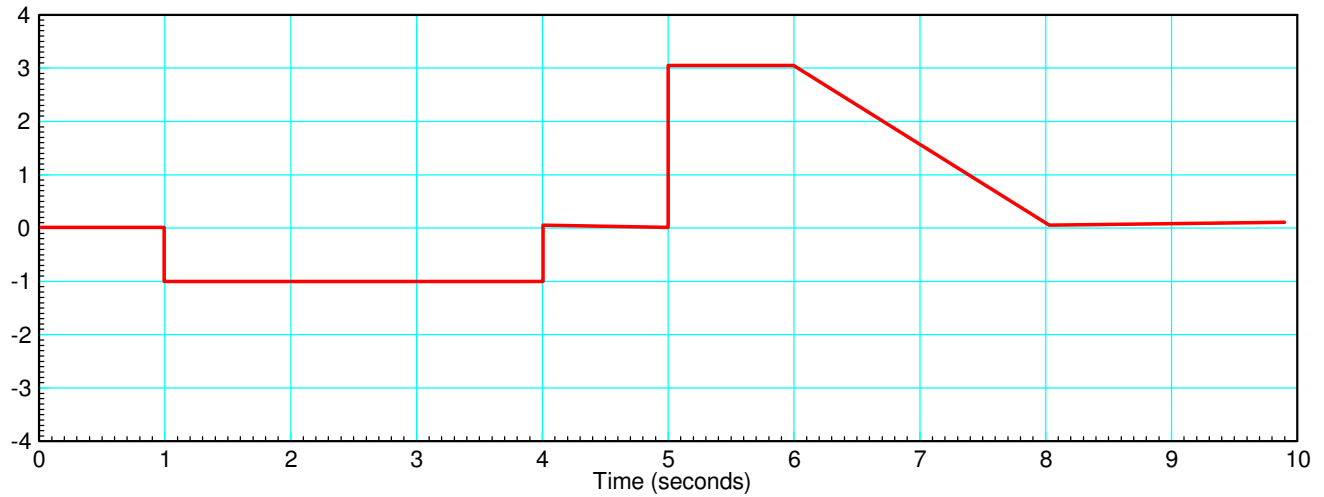# ECE 111: Handout #10
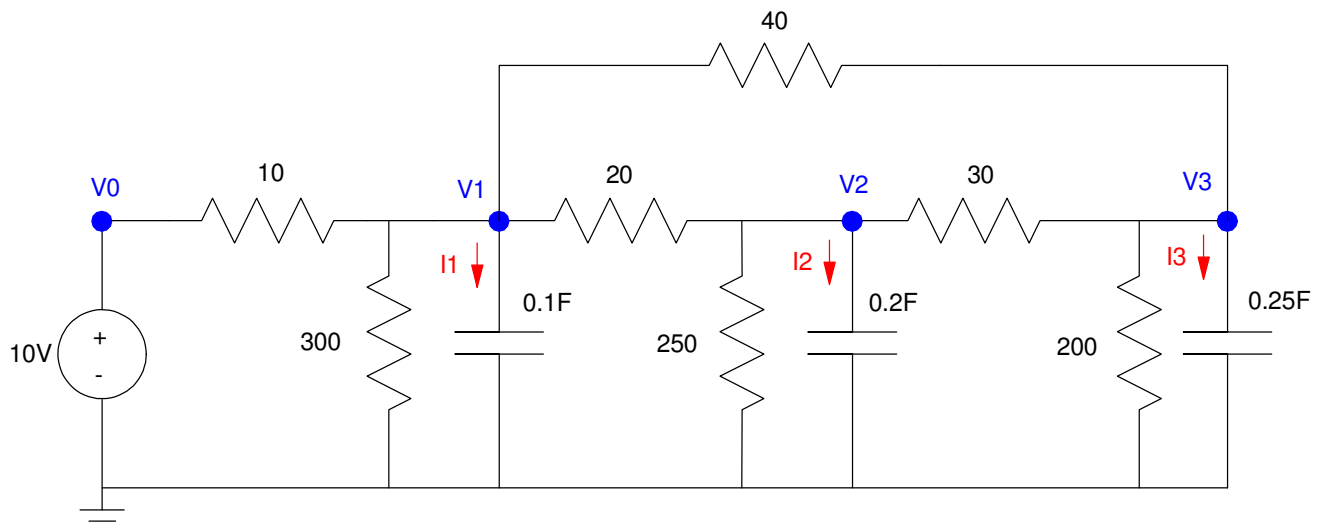
Week #10: ECE 311 Circuits II

1) Assume the current flowing into a 1F capacitor is as shown below. Sketch the voltage.

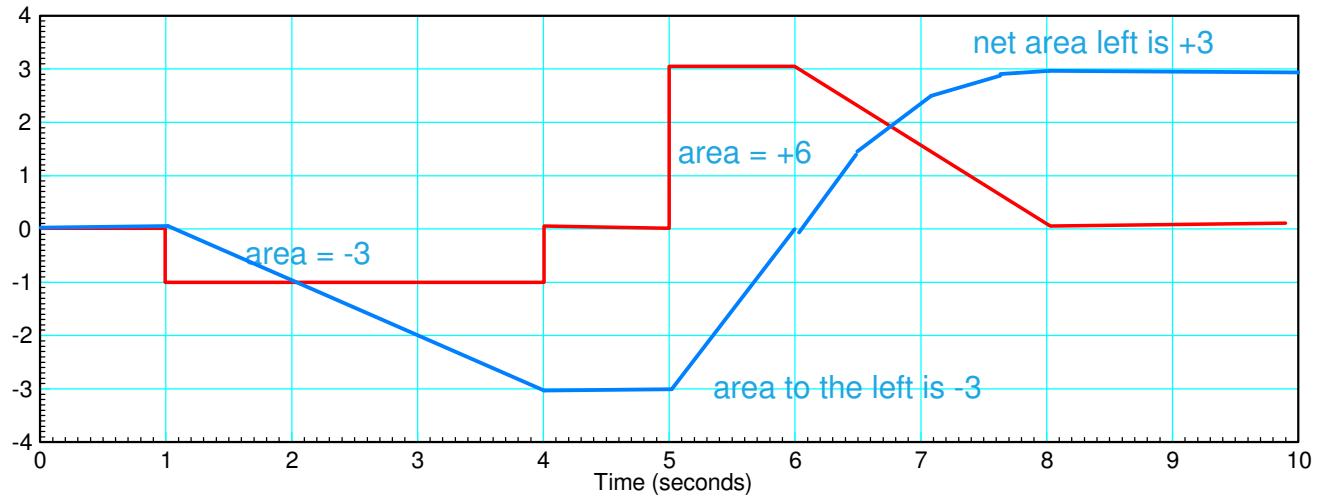- Assume Vc(0) = 0V
- $V = \frac{1}{C} \int I(t)\ dt$

2) Write the differential equations which describe the following circuit

Problem #1

Capacitors integrate. The voltatge will be the integral of the current (shown in blue)

- note: integral is the area under the curve
-

Problem #2

The basic equations are

$$I = C\frac{dV}{dt} = C\dot{V}$$

$$I_1 = 0.1\dot{V}_1 = \left(\frac{10-V_1}{10}\right) + \left(\frac{V_2-V1}{20}\right) + \left(\frac{V_3-V_1}{40}\right) - \left(\frac{V_1}{300}\right)$$

$$I_2 = 0.2\dot{V}_2 = \left(\frac{V_1-V_2}{20}\right) + \left(\frac{V_3-V_2}{30}\right) - \left(\frac{V_2}{250}\right)$$

$$I_3 = 0.25\dot{V}_3 = \left(\frac{V_1-V_3}{40}\right) + \left(\frac{V_2-V_3}{30}\right) - \left(\frac{V_3}{200}\right)$$