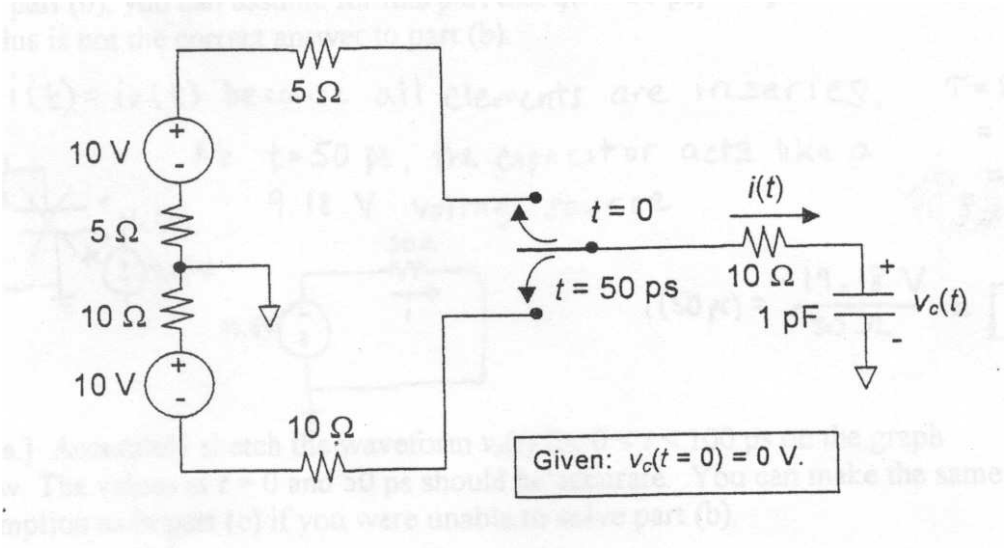
EECS 40 Midterm 1 - Spring 2001
Professor Howe

1. Capacitor Charging/Discharging [17 points]

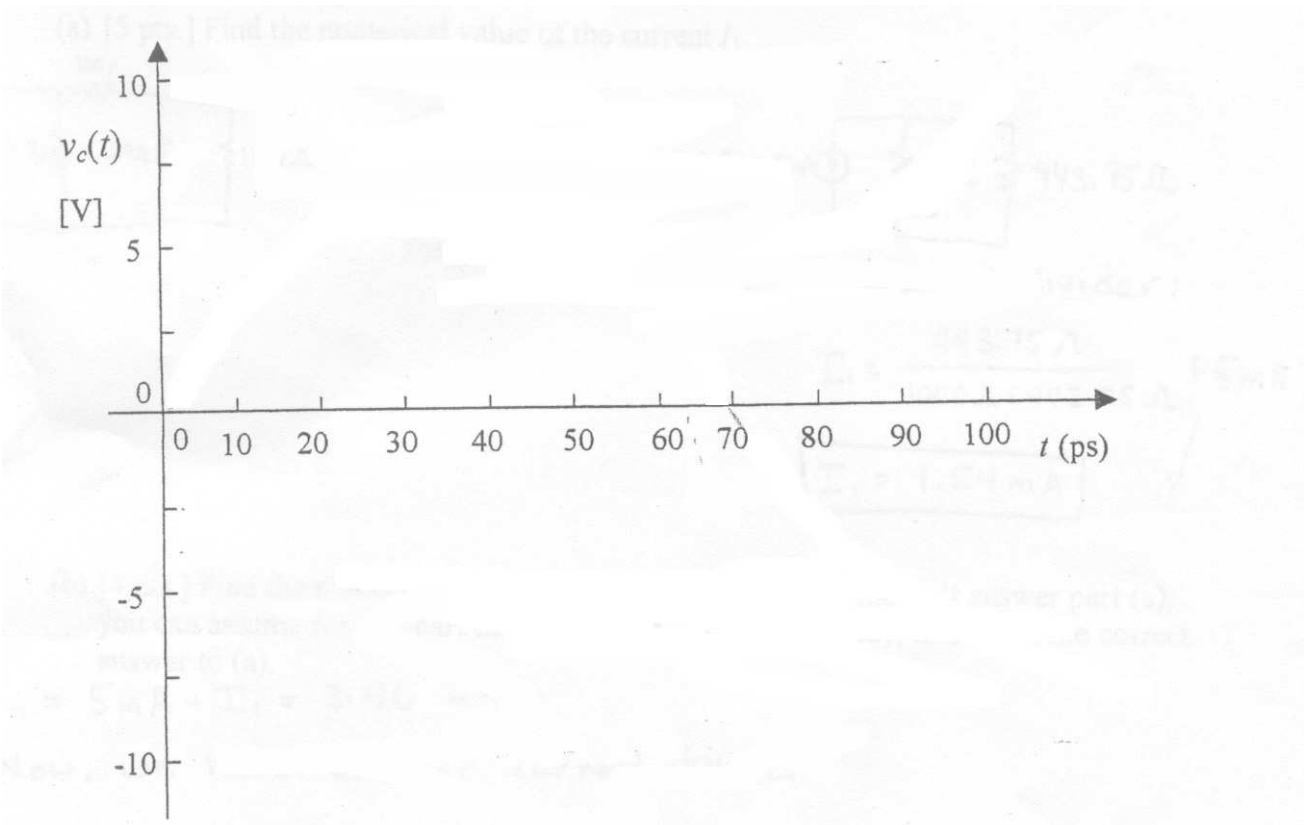


(a) [4 pts] What is the value of the current i ($t = 0^+$) in Amperes? The switch moves up at t = 0 and down at t = 50 ps. (note that 1 ps = 10^{-12} s).

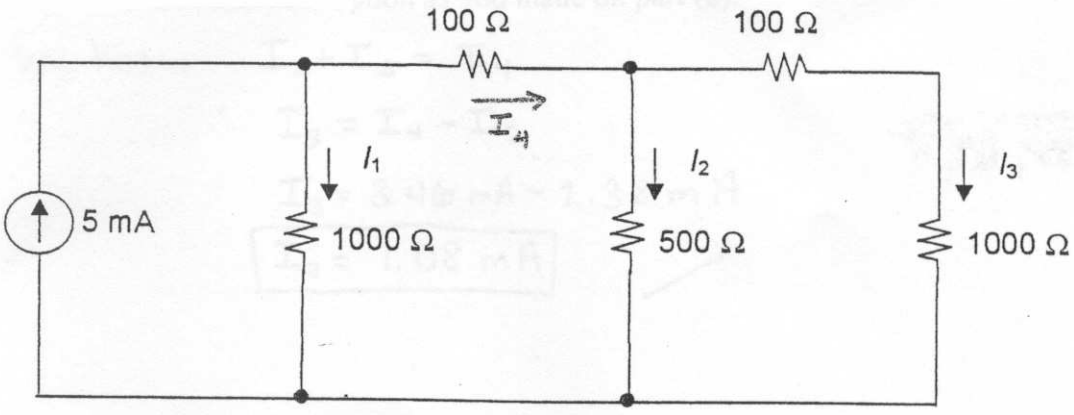
(b) [4 pts] What is the charge q on the + plate of the 1 pF capacitor in pC at t = 50 ps?

(c) [4 pts] What is the value of the current i ($t = 50^+$ ps) in Amperes? If you couldn't solve part (b), you can assume for this part that q(t = 50 ps) = 5 pC. Needless to say, this is not the correct answer to part (b).

(d) [5 pts] Accurately sketch the waveform vc(t) for 0<t<100 ps on the graph below. The values at t = 0 and 50 ps should be accurate. You can make the same assumption in part (c) if you were unable to solve part (b).



2. Ladder circuit [16 points]



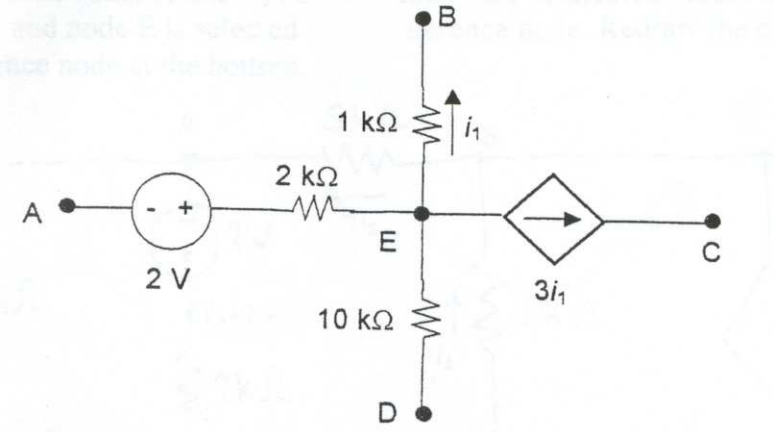
(a) [5 pts] Find the numerical value of the current I_1.

(b) [4 pts] Find the numerical value of the current I_2. If you couldn't answer part (a), you can assume for this part that I_1 = 2mA. Needless to say, this is not the correct answer to (a).

(c) [3pts] Find the numerical value of the current I_3. In case you couldn't solve part (a), you can

make the same assumption as you made on part (b).
(d) [4 pts] What is the total power absorbed by all the resistors in milliWatts?

3. Linear Circuit Analysis [17 points]



(a) [4pts] For this part, nodes A, C and D are connected to node B, which is selected as the reference node. Redraw the circuit with the reference node at the bottom.

(b) [4 pts] For the connections in part (a), find the numerical value of the current i_1 in microamps.

(c) [4 pts] We completely change the connections for this part: a 5 k-ohm resistor is connected between nodes A and B, nodes A and D are connected, nodes B and C are connected, and node E is selected as the reference node. Redraw the circuit with the reference node at the bottom.

(d) [5 pts] Solve for the numerical value of the voltage V_A in Volts.