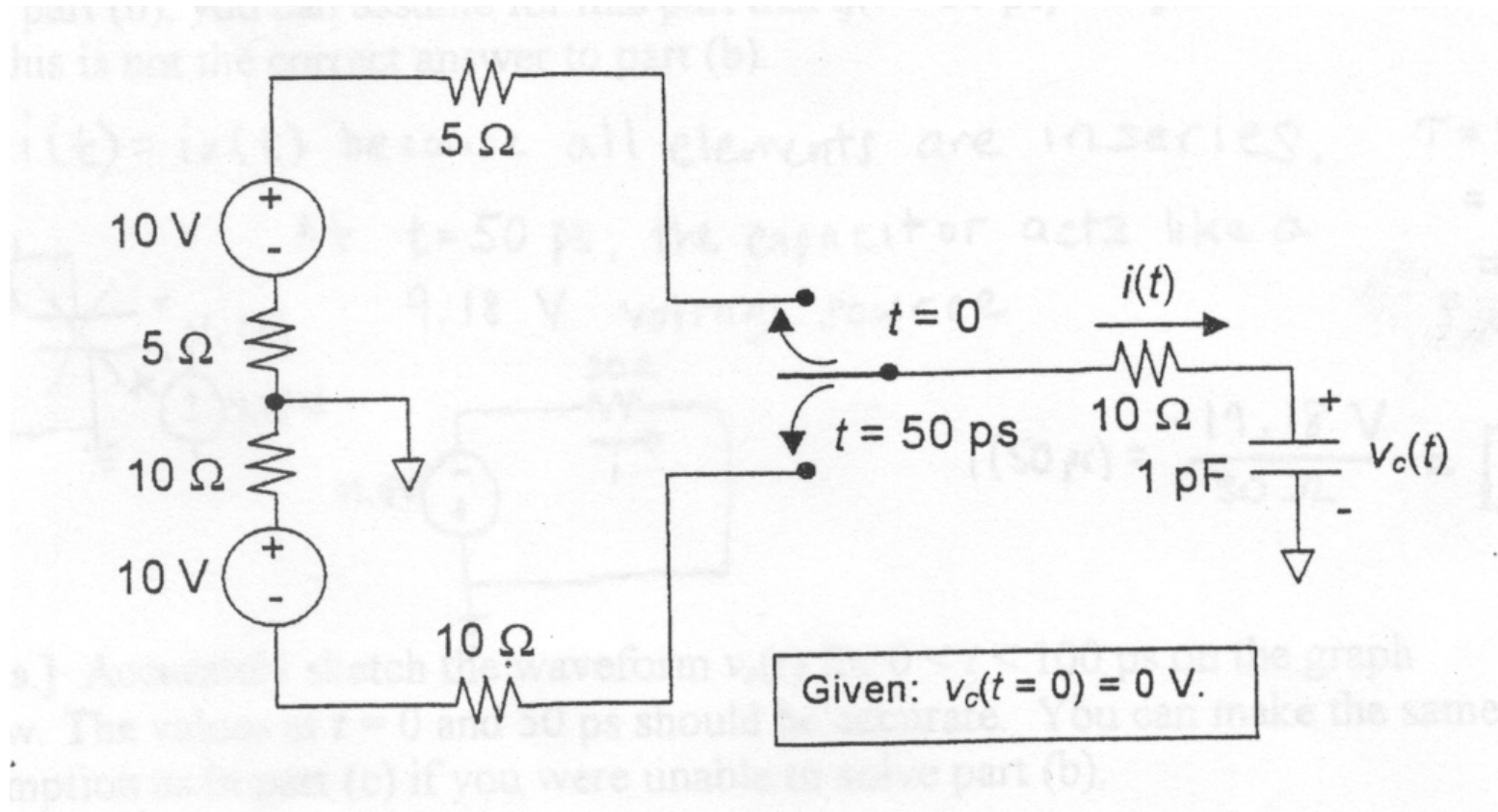


EECS 40 Midterm 1 - Spring 2001
Professor Howe

1. Capacitor Charging/Discharging [17 points]



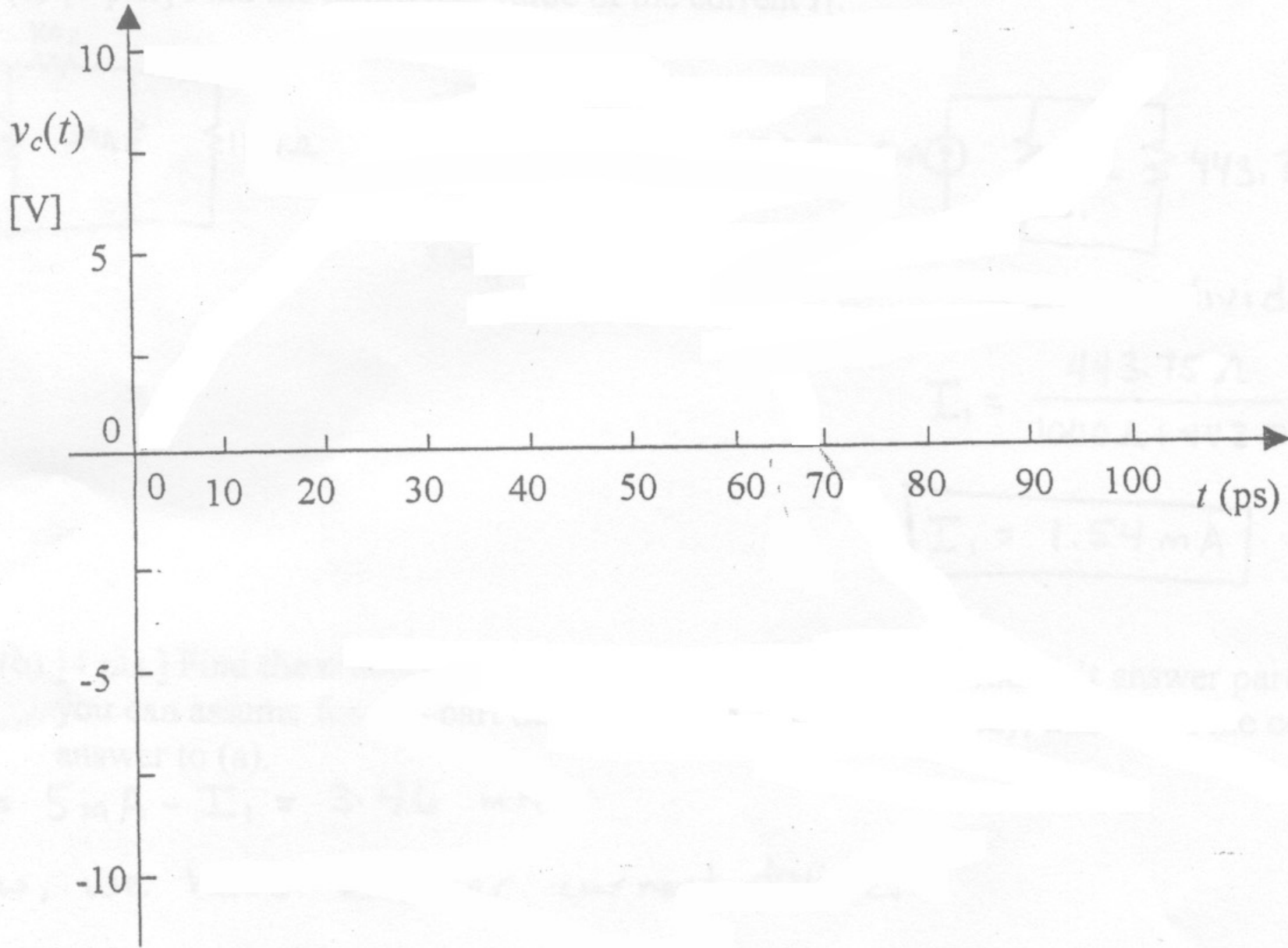
(a) [4 pts] What is the value of the current $i(t = 0)$ in Amperes? The switch moves up at $t = 0$ and down at $t = 50$ ps. (note that $1 \text{ ps} = 10^{-12}$ s).

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

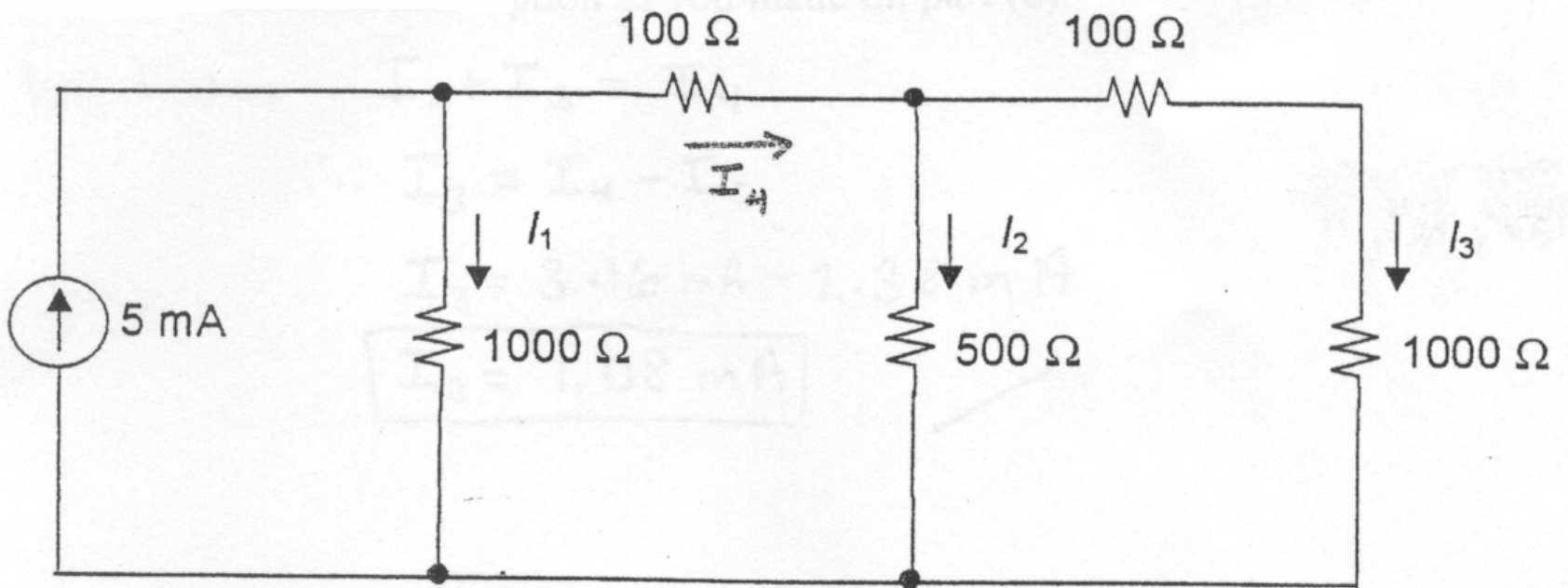
(c) [4 pts] What is the value of the current $i(t = 50 \text{ ps})$ in Amperes? If you couldn't solve part (b), you can assume for this part that $q(t = 50 \text{ ps}) = 5 \text{ pC}$. Needless to say, this is not the correct answer to part (b).

(d) [5 pts] Accurately sketch the waveform $v_c(t)$ 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).

(a) [5 pts.] Find the maximum value of the current i_1 .



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 .

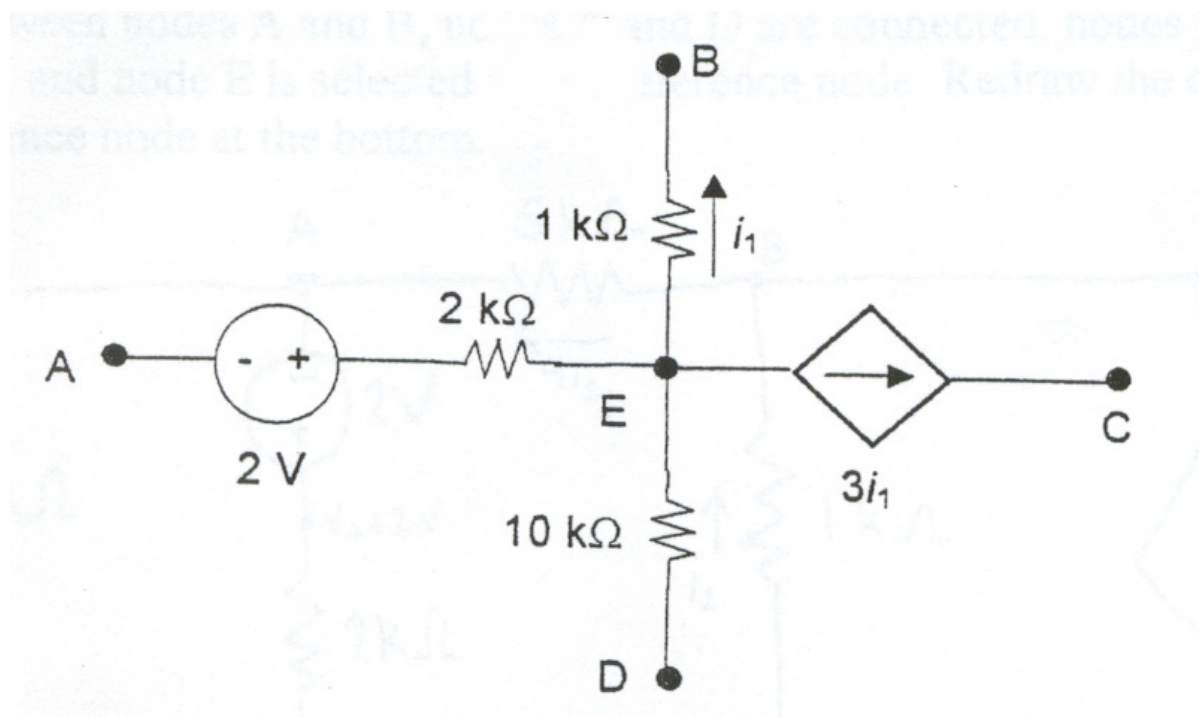
. If you couldn't answer part (a), you can assume for this part that $I_1 = 2\text{mA}$. Needless to say, this is not the correct answer to (a).

(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.