Name _____

ELEC 101: Take-Home Quiz
March 21, 2005
Prof. Rich Kozick

Rules: You may use the Bobrow textbook, class notes, and a calculator to complete this exam. However, you must work *alone*, and you are not permitted to discuss the exam with anyone.

Due Date: The exam is due at 2 PM on Wednesday, March 23, at our regular class meeting.

Show your work and explain your reasoning for full credit. Feel free to attach additional pages containing your answers. Good luck and have fun!

Problem 1: (This is the only question.)

In the circuit below, the switch is closed at time $t = 0$. Please find an equation for the capacitor voltage, $v_c(t)$, for $t \geq 0$, and make a graph of $v_c(t)$. Approximately how long does it take for the capacitor to charge?
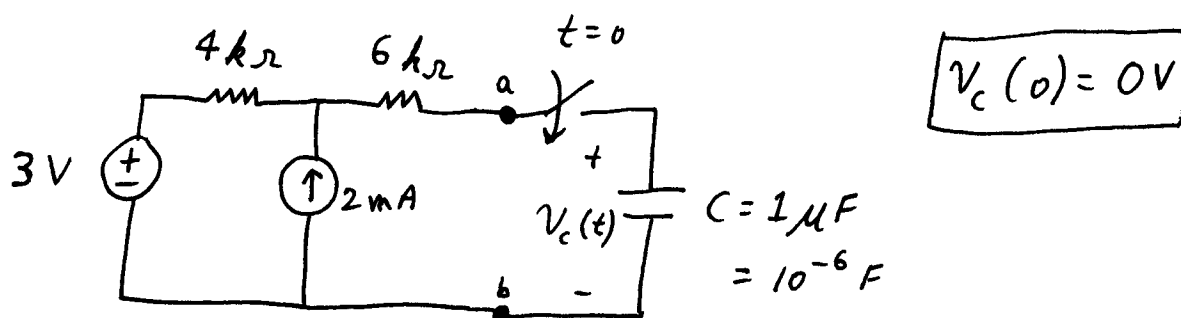
One way to solve this problem is to find the Thevenin equivalent circuit for the circuit to the left of terminals a and b. Then, you can consider the capacitor as the "load," and you can find $v_c(t)$ by attaching the capacitor to the Thevenin equivalent circuit. If you use this approach, then remember you can use nodal analysis to help you solve for the open-circuit voltage and the short-circuit current.

Another way to solve this problem is to apply nodal analysis to the circuit as it is given above, find the differential equation, and then find the solution to the differential equation.