Name: _____ (please print)

Signature: _____

ECE 2202 Quiz 2
September 23, 2020
Online

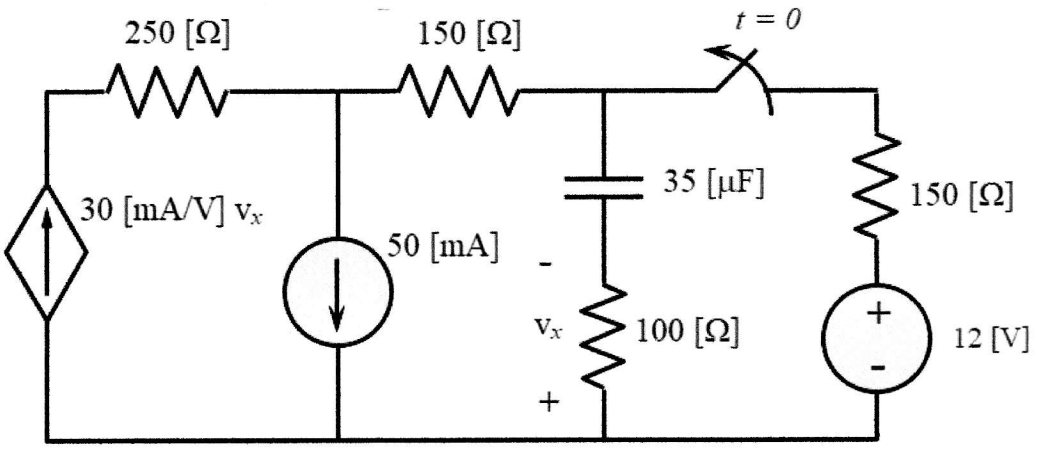
1. This quiz is open book, open notes.
2. Show all work necessary to complete the problem. A solution without the appropriate work shown will receive no credit. A solution which is not given in a reasonable order will lose credit.
3. Show all units in solutions, intermediate results, and figures. Units in the quiz will be included between square brackets.
4. If the grader has difficulty following your work because it is messy or disorganized, you will lose credit.
5. Do not use red ink. Do not use red pencil.
6. You will have 30 minutes to work on this quiz, and 15 minutes to download/print, scan and submit.

_____/25

Room for extra work

In the circuit below, the switch was closed for a long time, and then opened at t = 0.

a) Find the energy stored in the capacitor at 20 [ms].
b) Find $v_x(0^-)$ and $v_x(0^+)$.



Room for extra work

In the circuit below, the switch was closed for a long time, and then opened at t = 0.

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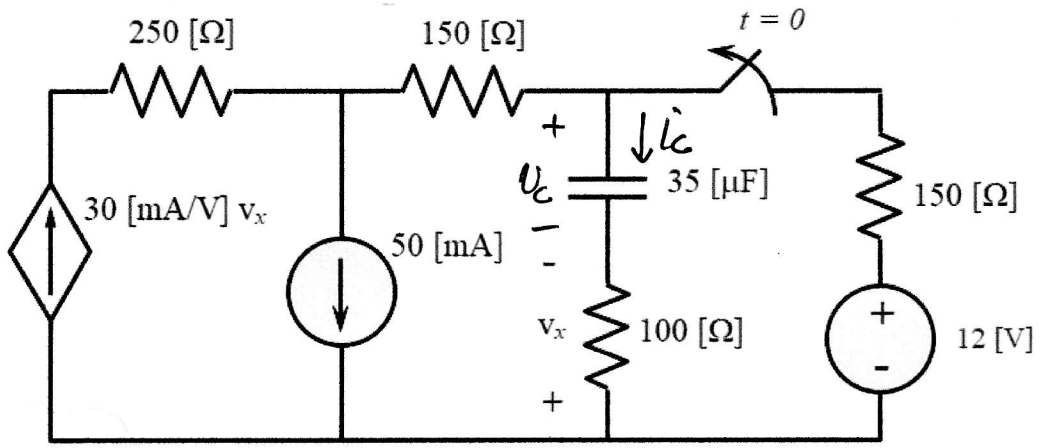
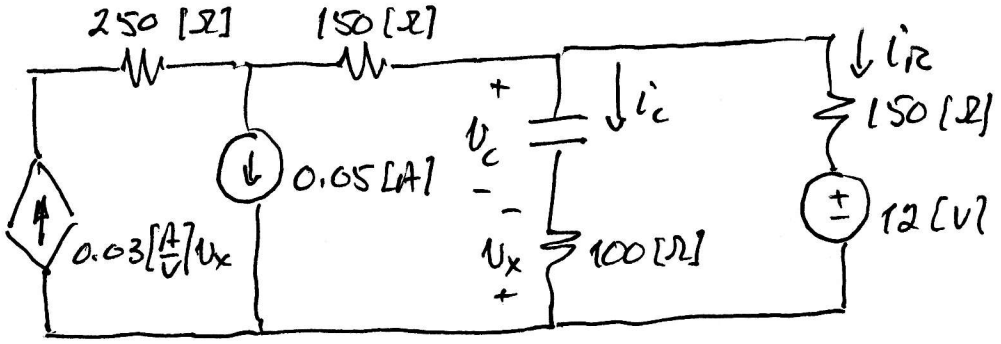


We have labeled the capacitor voltage and current.

Draw for $t < 0$.



Since the switch was closed for a long time, $i_C = 0$.

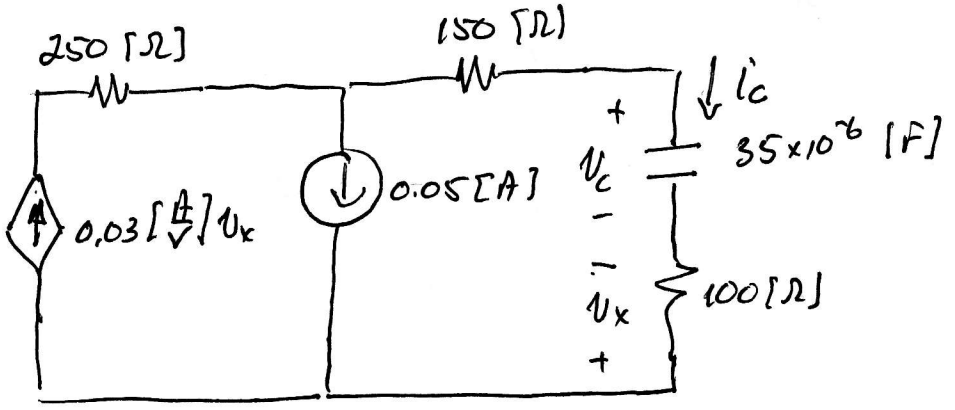
$\Rightarrow v_x = 0$

So $i_R = 0.03 v_x - 0.05 = -0.05$ [A]

+5 $v_c(0^-) = v_c(0^+) = -0.05(150) + 12 = 4.5$ [V]

Now draw for $t > 0$:

Room for extra work



$i_c = 0.03\,v_x - 0.05$ $\qquad v_x = -(0.03\,v_x - 0.05)\cdot 100$

$v_x = -3v_x - 5$

$\Rightarrow v_x = \frac{5}{4} = 1.25$ [V]

+7 $i_c = -0.0125$ [A]

$\therefore v_c = \frac{1}{35\times10^{-6}} \int_0^{0.02\,[s]} (-0.0125)\,dt + 4.5$ [V]

+6 a) $v_c(0.02\,[s]) = -2.643$ ~~-45.5~~ [V]

+2 $\Rightarrow$ $W_{\text{stored in C}} = \frac{1}{2}(35\times10^{-6})(-2.643)^2 = 122$ [μJ] ~~36.25~~ [mJ]

b) $v_x(0^+) = -i_c \cdot 100 = 1.25$ [V].

+3 Since i_c is constant, $v_x = 1.25$ [V] for all t.

+2 For $t<0$, $i_c = 0 \Rightarrow v_x(0^-) = 0$.