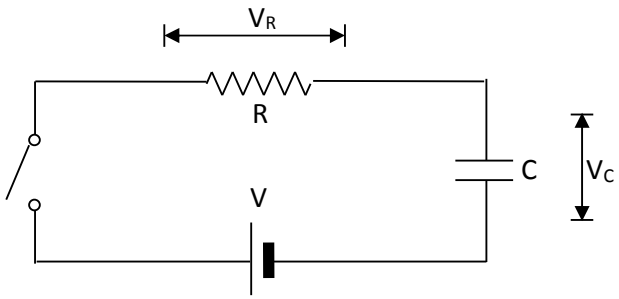
Name: _____ Sec: _____

PHY 232 Fall 2017 Supplementary Work (Not to be collected)

Class 25. RC Circuits

PART A.



If Q is the charge stored in the capacitor and I is the current from the battery. Switch is closed at t=0.

(a) What is the value of the following quantities at t=0 (in terms of V, R, and C):

Q = 0 I = V/R V_C= 0 V_R= V

(b) What is the value of the following quantities at t=∞ (in terms of V, R, and C):

Q = CV I = 0 V_C= V V_R= 0

(c) Write down the following quantities as a function of time (in terms of V, R, C, and t):

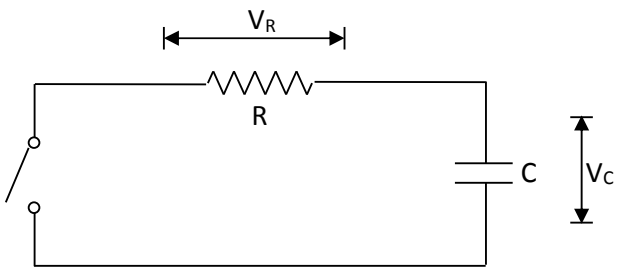
$Q(t) = CV(1-e^{-\frac{t}{RC}})$

$I(t) = \frac{V}{R}e^{-\frac{t}{RC}}$

$V_C(t) = V(1-e^{-\frac{t}{RC}})$

$V_R(t) = Ve^{-\frac{t}{RC}}$

PART B.



If Q is the charge stored in the capacitor and I is the current through R. The capacitor is originally charged with a charge of Q_0. Switch is closed at t=0.

(a) What is the value of the following quantities at t=0 (in terms of V, R, and Q_0):

Q = Q_0 I = $Q_0/(RC)$ V_C= Q_0/C V_R= Q_0/C

(b) What is the value of the following quantities at t=∞ (in terms of V, R, and Q_0):

Q = 0 I = 0 V_C= 0 V_R= 0

(c) Write down the following quantities as a function of time (in terms of V, R, Q_0 and t):

$Q(t) = Q_0 e^{-\frac{t}{RC}}$

$I(t) = \frac{Q_0}{RC} e^{-\frac{t}{RC}}$

$V_C(t) = \frac{Q_0}{C} e^{-\frac{t}{RC}}$

$V_R(t) = \frac{Q_0}{C} e^{-\frac{t}{RC}}$