# RC circuits and Diode Circuits
## Problem Set 2 for Tuesday Sept. 28

Gather together the four theory handouts that have been created and distributed. You will need them. Also get clean 8½×11 paper, a pencil, and an eraser. High-quality work begins with assembling good tools, and taking pride in using them well.

> These are directions not suggestions

1. A $100\mu F$ capacitor has been charged up by a 5V power source.

5V ═══ ═══ +Q $100\mu F$
          −Q
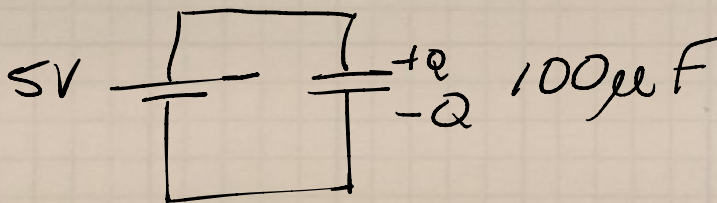
a. What is the charge Q on the positive plate of capacitor?

b. What is the total charge on the capacitor?

2.

10 kΩ   +Q   100 μF
           -Q
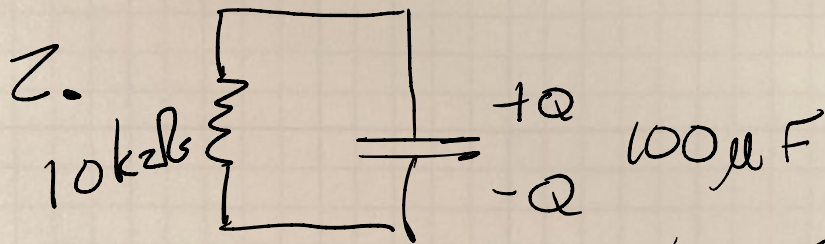
The charged up capacitor from problem 1
is allowed to discharge through
a 10 kΩ resistor.

Make an <u>accurate</u> graph of Q(t).

On the horizontal axis is time.
Have it go from 0 to 2.5 seconds
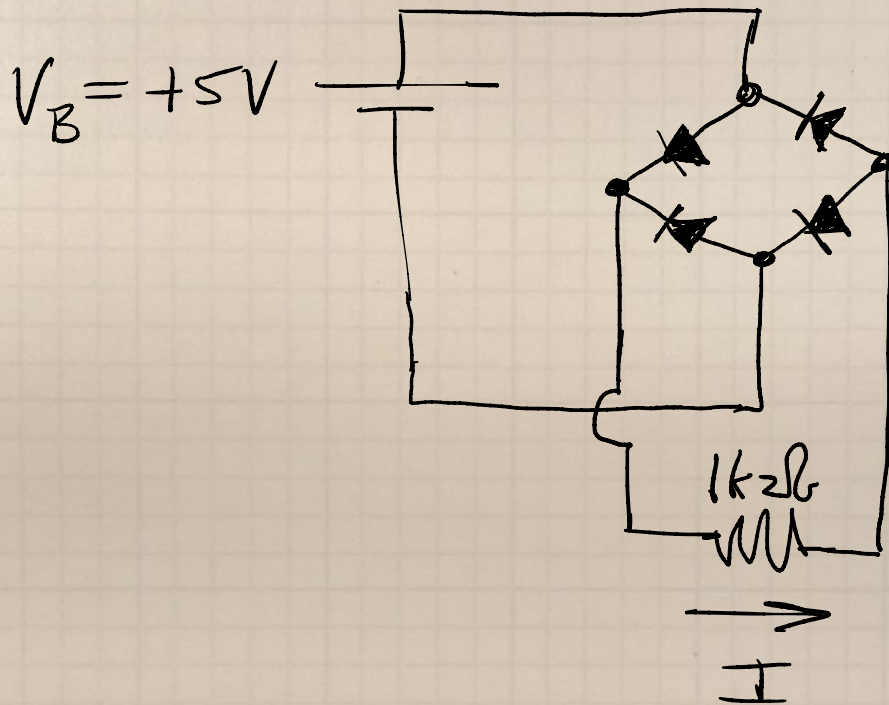with ticks every 0.5 seconds.

On the vertical axis is charge.
Have it go from 0.1 to 0.5 mC
with ticks every 0.1 mC ← milli coulombs

Before plotting your points, make and
fill in a table, that will look something
like this

t	0.0s	0.5s	1.0s	1.5s	etcetera
Q(t)	0.5mc	et cetera			

3. Diodes

Consider the following circuit:

$V_B = +5V$

a. How much current flows through the resistor?

b. To the right (as drawn) or to the left?

<u>Hints</u> on <u>next page</u>

HINTS FOR 3:

* You can assume the diodes are perfect — they either freely transmit current (if forward biased) or the completely block current.

* A diode that is completely blocking current can be removed from the circuit. Redraw the circuit with the diodes that are blocking current removed.

4. Diodes again

I have reversed the battery (no other changes):
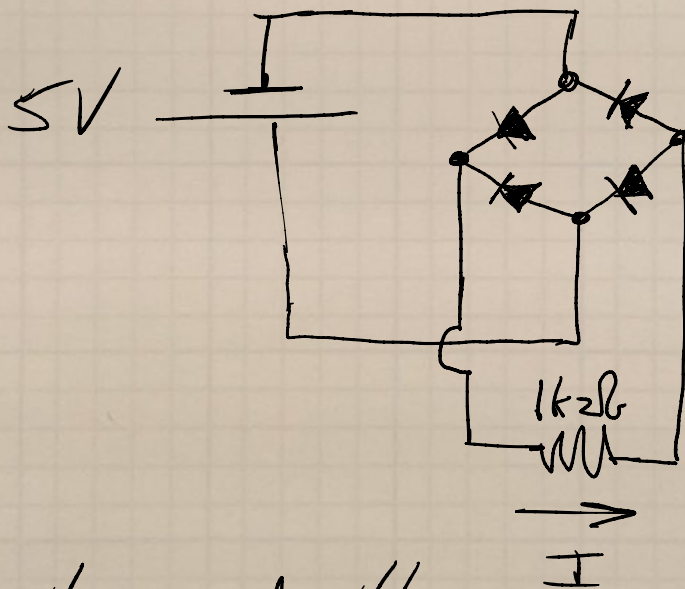
4a. and 4b.
Answer the same questions as were asked in 3a. and 3b.

5. Compare your answers to 3b and 4b. Is this a possibly important use of four diodes?