CENGAGE | WEBASSIGN

DC Circuits #3 (Homework)

INSTRUCTOR
Ian Page
Singapore American School

Current Score

QUESTION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
POINTS	1/1 ✓	1/1 ✓	1/1 ✓	1/1 ✓	–/2	–/1	–/1	–/1	–/1	0/9	–/3	–/2	3/3 ✓	2/2 ✓	4/4 ✓	3/4

TOTAL SCORE: 16/37 43.2%

Due Date

WED, DEC 18, 2024
11:59 PM GMT+8

REQUEST EXTENSION

Assignment Submission & Scoring

Assignment Submission

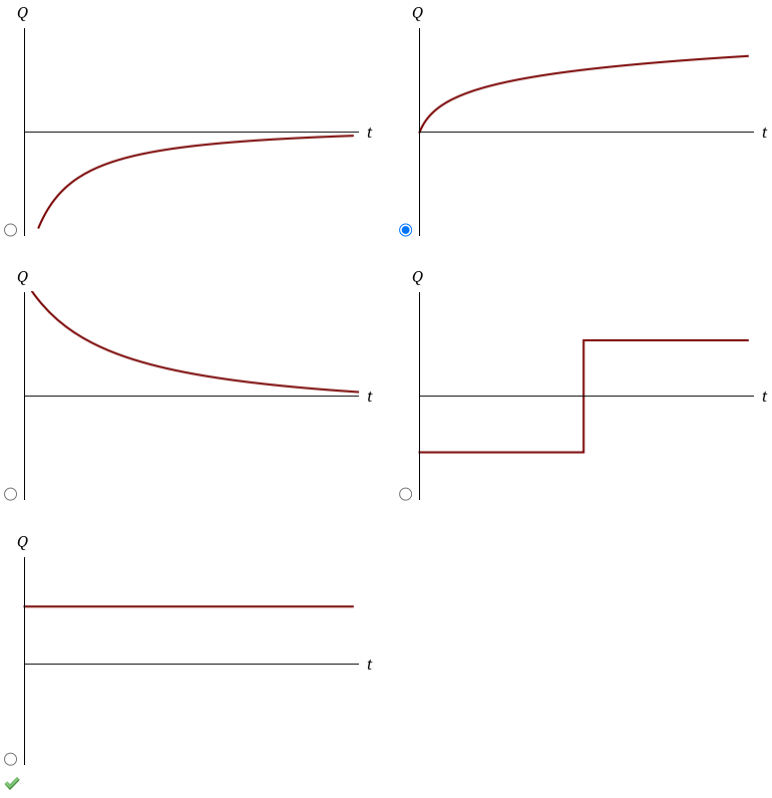
For this assignment, you submit answers by question parts. The number of submissions remaining for each question part only changes if you submit or change the answer.

Assignment Scoring

Your last submission is used for your score.

1. [1/1 Points] DETAILS MY NOTES OSCOLPHYSAP2016 21.6.WA.051. PREVIOUS ANSWERS ASK YOUR TEACHER

Which of the graphs below correctly shows the charge *versus* time in a simple *RC* circuit during the charging process?

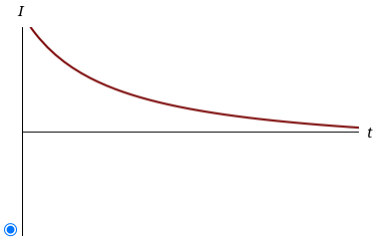


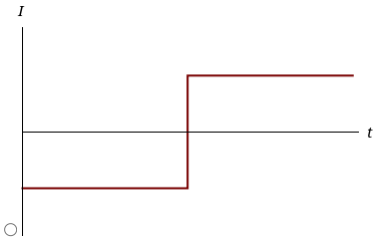
Additional Materials

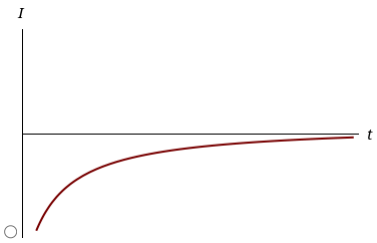
- Reading

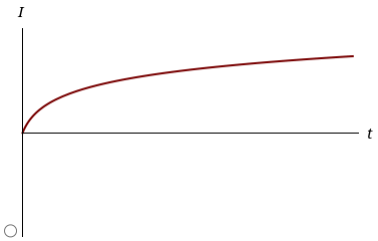
2. **[1/1 Points]** DETAILS MY NOTES **OSCOLPHYSAP2016 21.6.WA.052.** PREVIOUS ANSWERS ASK YOUR TEACHER

Which of the graphs below correctly shows the current flowing through the resistor during the charging process in a simple *RC* circuit?







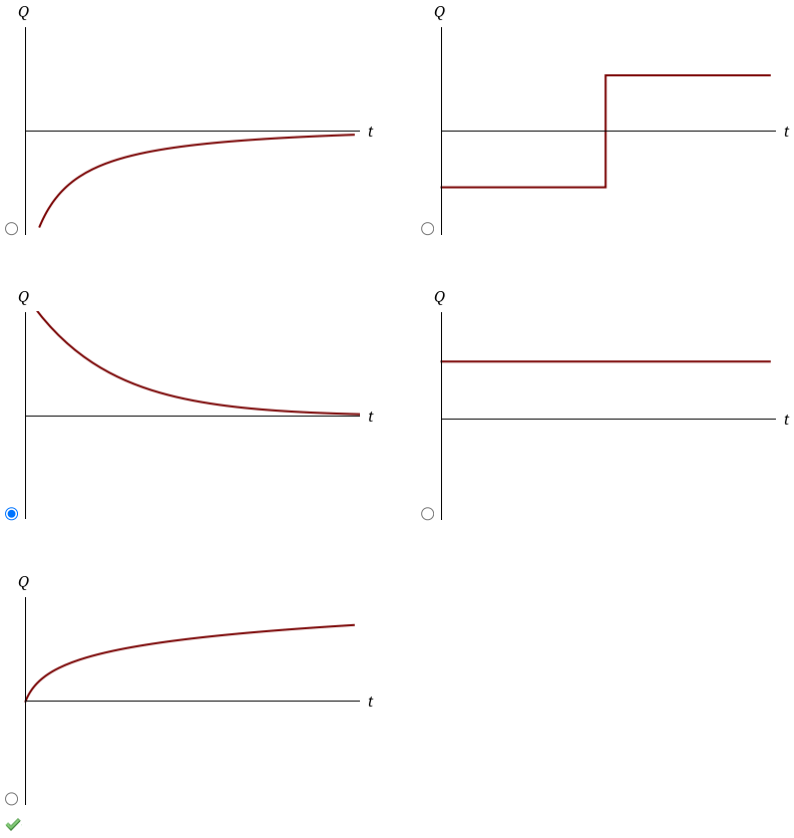


Additional Materials

- Reading

3. **[1/1 Points]** DETAILS MY NOTES **OSCOLPHYSAP2016 21.6.WA.053.** PREVIOUS ANSWERS ASK YOUR TEACHER

Which of the graphs below correctly shows the charge *versus* time in a simple *RC* circuit during the discharging process?

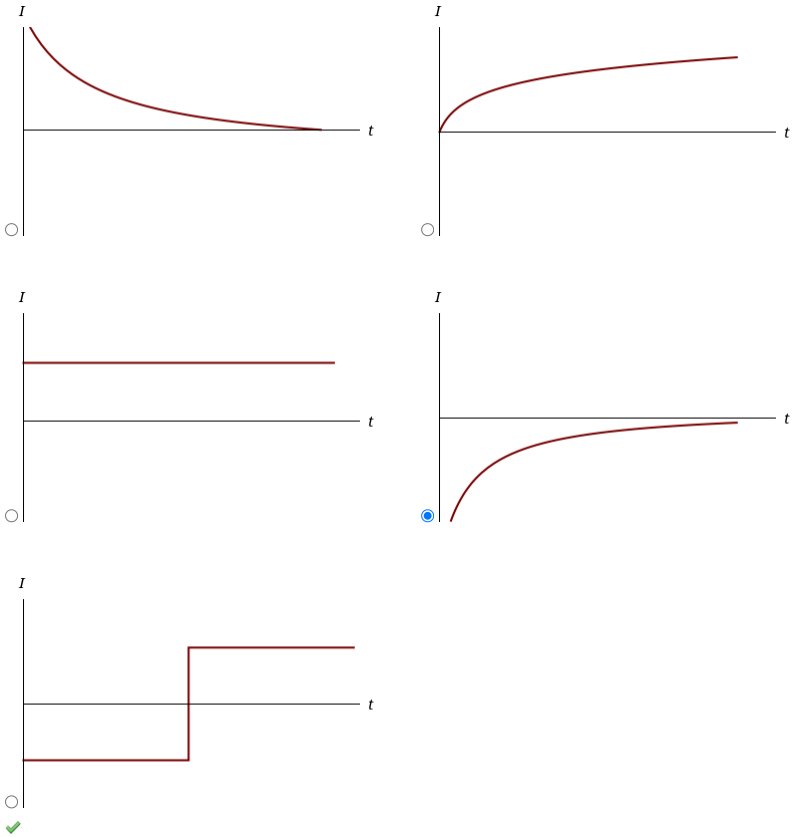


Additional Materials

- Reading

4. **[1/1 Points]** DETAILS MY NOTES **OSCOLPHYSAP2016 21.6.WA.054.** PREVIOUS ANSWERS ASK YOUR TEACHER

Which of the graphs below correctly shows the current *versus* time in a simple *RC* circuit during the discharging process?

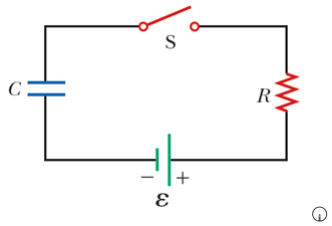


Additional Materials

- Reading

5. **[–/2 Points]** DETAILS MY NOTES **SERCPAP12 18.5.P.038.** ASK YOUR TEACHER

The capacitor in the figure below is uncharged for $t < 0$. If $\mathcal{E} = 7.02$ V, $R = 61.4$ Ω, and $C = 2.50$ μF, use Kirchhoff's loop rule to find the current (in A) through the resistor at the following times.



HINT

(a) $t = 0$, when the switch is closed

A

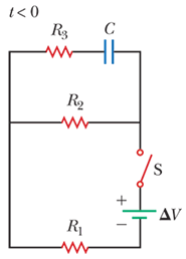
(b) $t = \tau$, one time constant after the switch is closed

A

Need Help? Read It

6. [–/1 Points] DETAILS MY NOTES SERCPAP12 18.STEP.5.6A. ASK YOUR TEACHER

Consider the *RC* circuit in the following figure, with R_1 = 6.00 Ω, R_2 = 5.00 Ω, R_3 = 1.00 Ω, and C = 3.00 μF.



Assume the switch is closed. After a long time, what is the current through R_2, if the battery contributes a potential difference of ΔV = 24.0 V?

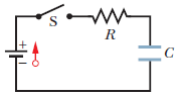
[ ] A

Need Help? Read It

7. [–/1 Points] DETAILS MY NOTES HRW10 27.P.096. ASK YOUR TEACHER

The figure below shows an ideal battery of emf $\mathscr{E}$ = 12 V, a resistor of resistance R = 4.3 Ω, and an uncharged capacitor of capacitance C = 4.0 μF. After switch S is closed, what is the current through the resistor when the charge on the capacitor is 7.1 μC?

[ ] A

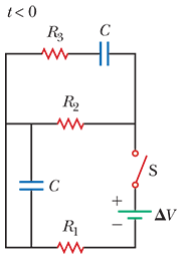


Additional Materials

- eBook

8. [–/1 Points] DETAILS MY NOTES SERCPAP12 18.STEP.5.6B. ASK YOUR TEACHER

The *RC* circuit in the figure has resistances R_1 = 6.00 Ω, R_2 = 5.00 Ω, and R_3 = 4.00 Ω, capacitance C = 3.00 μF, and a battery with ΔV = 14.0 V.



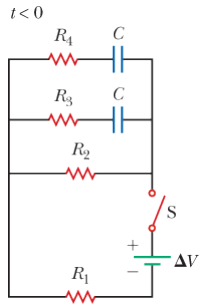
The capacitors are uncharged when the switch is closed at t = 0. After many *RC* time constants, what is the current (in A) through R_1?

[ ] A

Need Help? Read It

9. **[–/1 Points]** DETAILS MY NOTES **SERCPAP12 18.STEP.5.6C.** ASK YOUR TEACHER

The *RC* circuit in the following figure has resistances R_1 = 5.00 Ω, R_2 = 2.00 Ω, and R_3 = 5.00 Ω, capacitance C = 2.00 μF, and a battery with ΔV = 12.0 V.



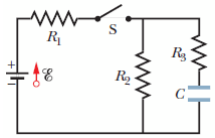
The capacitors are uncharged when the switch is closed at t = 0. After many *RC* time constants, what is the current (in A) through R_1?

A

Need Help? Read It

10. **[0/9 Points]** DETAILS MY NOTES **HRW10 27.P.063.SSM.** PREVIOUS ANSWERS ASK YOUR TEACHER PRACTICE ANOTHER

In the circuit of the figure below, $\mathscr{E}$ = 1.4 kV, C = 5.0 μF, $R_1 = R_2 = R_3$ = 0.68 MΩ. With C completely uncharged, switch S is suddenly closed (at t = 0).



(a) At t = 0, what is current i_1 in resistor 1?

[ ] ✖ A

(b) At t = 0, what is current i_2 in resistor 2?

[ ] ✖ A

(c) At t = 0, what is current i_3 in resistor 3?

[ ] ✖ A

Repeat for $t = \infty$ (that is, after many time constants.)

(d) What is current i_1?

[ ] A

(e) What is current i_2?

[ ] A

(f) What is current i_3?

[ ] A

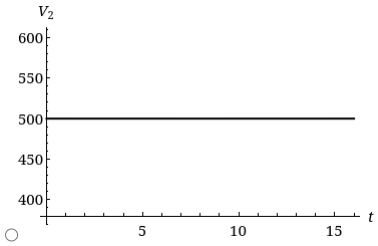
(g) What is the potential difference V_2 across resistor 2 at t = 0?

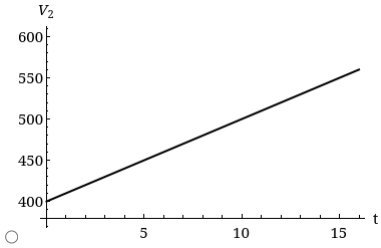
[ ] V

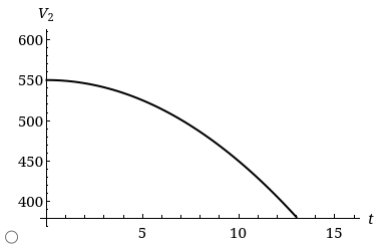
(h) What is V_2 at $t = \infty$?

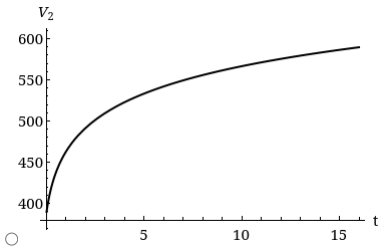
[ ] V

(i) Sketch V_2 versus t between these two extreme times.









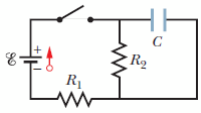
When a potential is suddenly put across a capacitor to charge it, does the capacitor act like ordinary wire or broken wire? How about a long time later? For each situation, did you draw the circuit? For each circuit, could you find equivalent resistance and then write a loop equation?

Additional Materials

- eBook

11. [-/3 Points] DETAILS MY NOTES HRW10 27.P.099.SSM. ASK YOUR TEACHER

In the figure below, the ideal battery has emf $\mathscr{E}$ = 26 V, the resistances are R_1 = 36 kΩ and R_2 = 10 kΩ, and the capacitor is uncharged.



(a) When the switch is closed at time t = 0, what is the current in resistance 1?
[ ] A

(b) When the switch is closed at time t = 0, what is the current in resistance 2?
[ ] A

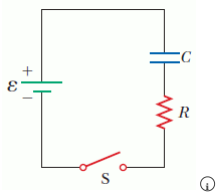
(c) A long time later, what is the current in resistance 2?
[ ] A

Additional Materials

- eBook

12. [-/2 Points] DETAILS MY NOTES SERCPAP12 18.5.P.033.OP. ASK YOUR TEACHER

The figure below shows a capacitor, with capacitance C = 35.0 μF, and a resistor, with resistance R = 72.5 kΩ, connected in series to a battery, with $\mathscr{E}$ = 17.0 V. The circuit has a switch, which is initially open.



(a) What is the circuit's time constant (in s)?
[ ] s

(b) After the switch is closed for one time constant, how much charge (in C) is on the capacitor?
[ ] C

Need Help? Read It

13. [3/3 Points] DETAILS MY NOTES SERCPAP12 18.5.P.034. PREVIOUS ANSWERS ASK YOUR TEACHER PRACTICE ANOTHER

An uncharged capacitor and a resistor are connected in series to a source of emf. If $\mathscr{E}$ = 12.00 V, C = 21.0 μF, and R = 100 Ω, find the following:

(a) the time constant of the circuit
2.10e-3 ✔ s

(b) the maximum charge on the capacitor
252 ✔ μC

(c) the charge on the capacitor after one time constant
159.3 ✔ μC

Need Help? Read It

14. [2/2 Points] DETAILS MY NOTES OSCOLPHYSAP2016 21.6.P.065. PREVIOUS ANSWERS ASK YOUR TEACHER PRACTICE ANOTHER

The duration of a photographic flash is related to an RC time constant, which is 0.180 μs for a certain camera.

(a) If the resistance of the flash lamp is 0.0490 Ω during discharge, what is the size (in μF) of the capacitor supplying its energy?
3.67 ✔ μF

(b) What is the time constant (in s) for charging the capacitor, if the charging resistance is 850 kΩ?
3.1195 ✔ s

Additional Materials

- Reading

15. **[4/4 Points]** DETAILS MY NOTES **OSCOLPHYSAP2016 21.6.P.066.** PREVIOUS ANSWERS ASK YOUR TEACHER PRACTICE ANOTHER

A 2.00 μF and a 4.00 μF capacitor can be connected in series or parallel, as can a 40.0 kΩ and a 100 kΩ resistor. Calculate the four *RC* time constants (in s) possible from connecting the resulting capacitance and resistance in series.

resistors and capacitors in series	0.186 ✓	s
resistors in series, capacitors in parallel	0.840 ✓	s
resistors in parallel, capacitors in series	0.038 ✓	s
capacitors and resistors in parallel	0.1714 ✓	s

†

Additional Materials

- Reading

16. **[3/4 Points]** DETAILS MY NOTES **OSCOLPHYSAP2016 21.6.P.068.** PREVIOUS ANSWERS ASK YOUR TEACHER PRACTICE ANOTHER

A 495 Ω resistor, an uncharged 1.50 μF capacitor, and a 6.12 V emf are connected in series.

(a) What is the initial current (in mA)?

12.36 ✓ mA

(b) What is the *RC* time constant (in s)?

0.7425 ✗ s

(c) What is the current (in mA) after one time constant?

4.54 ✓ mA

(d) What is the voltage (in V) on the capacitor after one time constant?

3.87 ✓ V

†

Additional Materials

- Reading

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