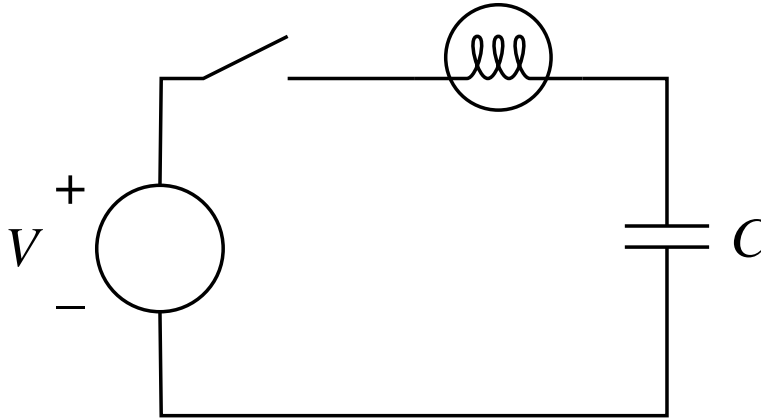


Capacitive Circuits

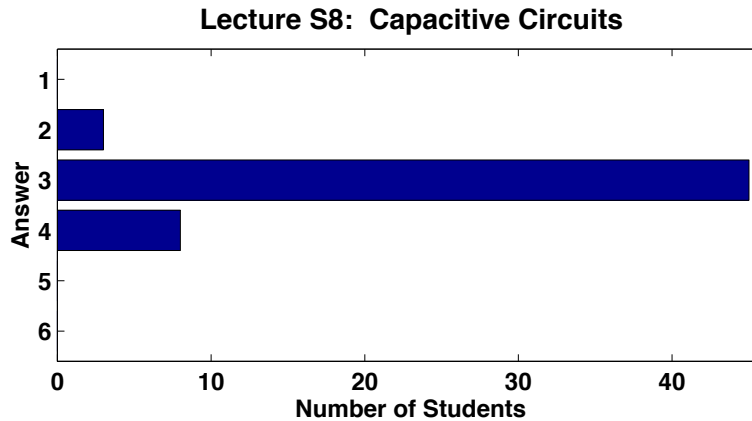
Concept Test



Before the switch is closed, the capacitor is fully discharged. After the switch is closed,

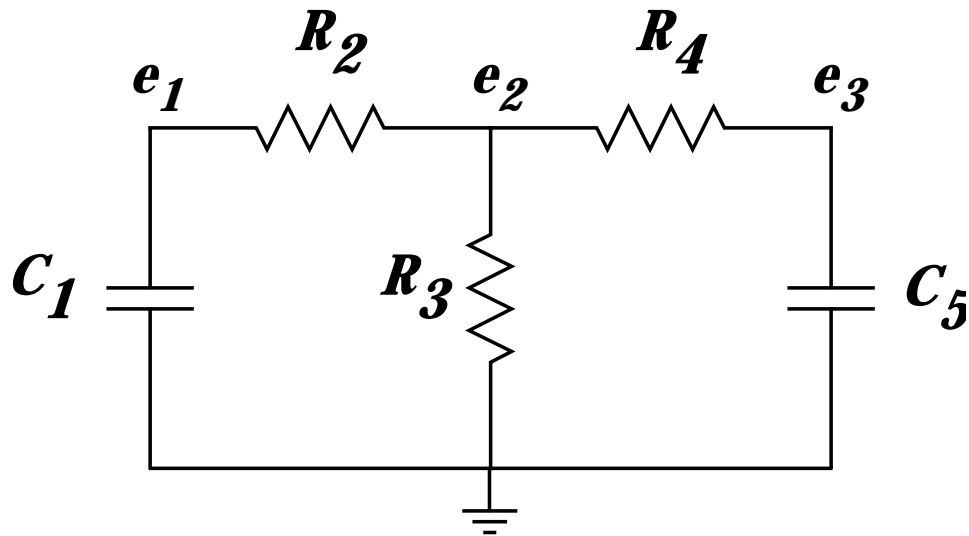
- 1. Nothing happens**
- 2. The light bulb glows continuously**
- 3. The light bulb glows, then dims**
- 4. The light bulb gradually begins to glow, then glows constantly**
- 5. None of the above**
- 6. Don't know**

Capacitive Circuits Solution



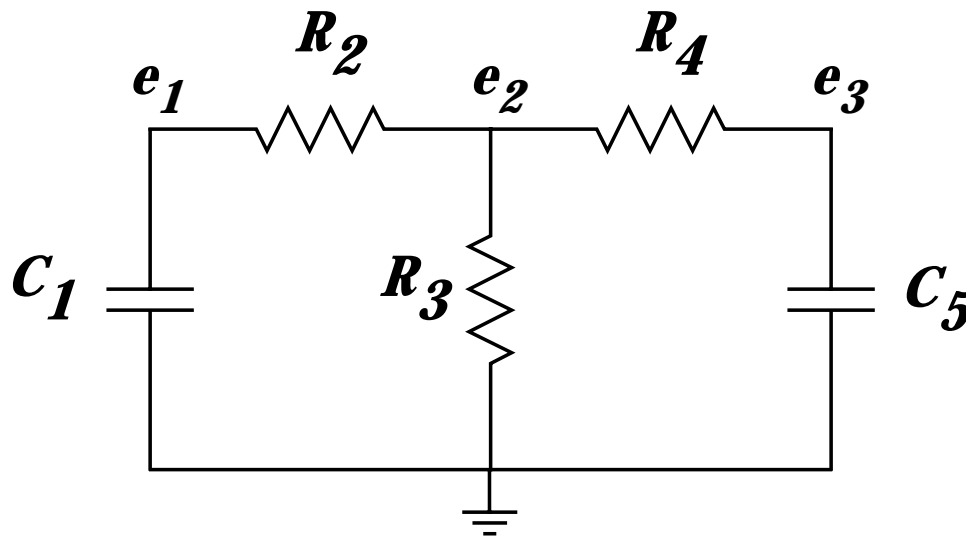
The correct answer is Number 3. Before the switch is closed, the capacitor is uncharged, and has 0 V across it. Immediately after the switch is closed, it still has 0 V across it, so the full voltage of the source is across the bulb — it glows. As current flows through the bulb, the capacitor is charged, and eventually it reaches the same potential as the source. At that point, no current flows through the bulb, and the bulb dims and goes out.

RC Circuit Equations Concept Test



For the network above, use the node method, and find the equation at each node that results from application of KCL at the node, in terms of the resistor conductances G and capacitor admittances C_s . You should do so without looking at your notes, and “by inspection,” if possible.

RC Circuit Equations Concept Test



My confidence that I have found the right equation at each node is:

1. 0%
2. 20%
3. 40%
4. 60%
5. 80%
6. 100%

RC Circuit Equations

Concept Test

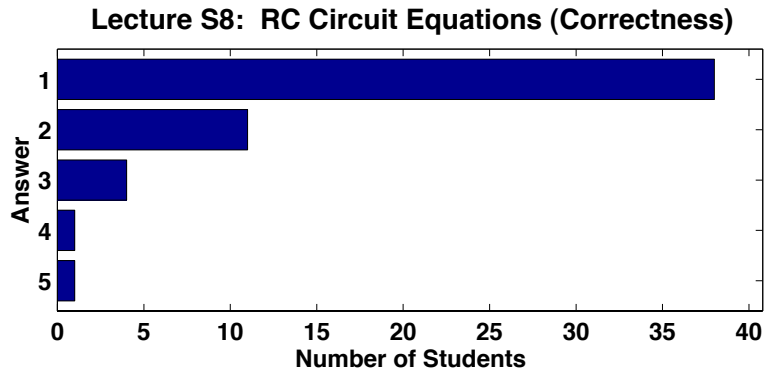
The correct equations are:

$$\begin{aligned}(C_1s + G_2) e_1 - G_2e_2 &= 0 \\ -G_2e_1 + (G_2 + G_3 + G_4) e_2 - G_4e_3 &= 0 \\ -G_4e_2 + (C_5s + G_4) e_3 &= 0\end{aligned}$$

My answer was

1. Completely correct.
2. Almost completely correct, with one or two small errors.
3. Correct at node e_2 , but incorrect at the other nodes.
4. Had numerous errors.
5. Not on target.

RC Circuit Equations Solution



The correct equations are found by applying the node method, treating the capacitors as conductances with conductance (admittance, really) C_s .

Most of the class had the correct answer. Good!