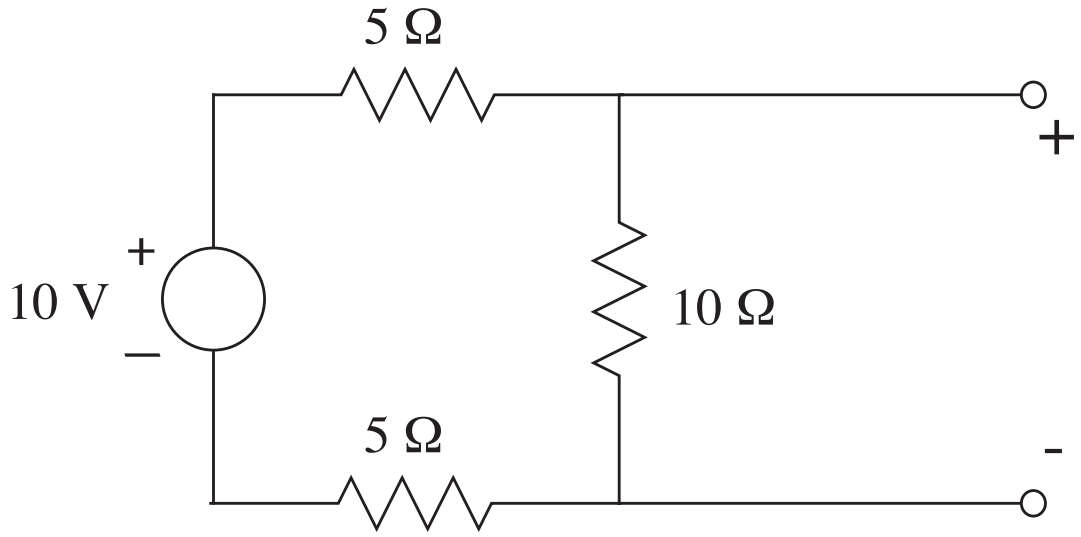
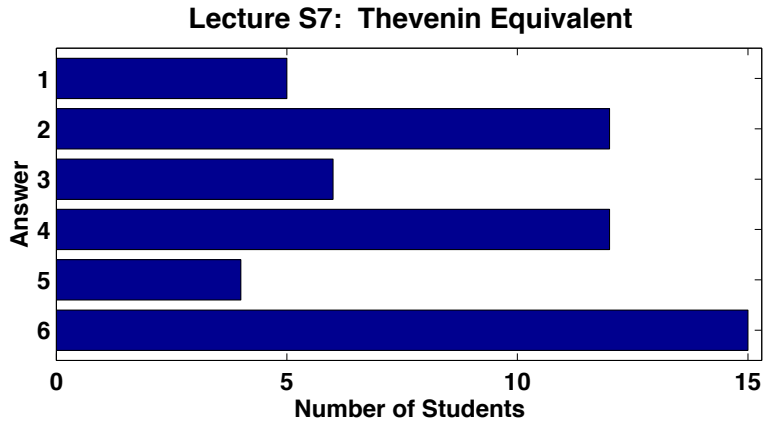
Thevenin Equivalent Circuit Concept Test

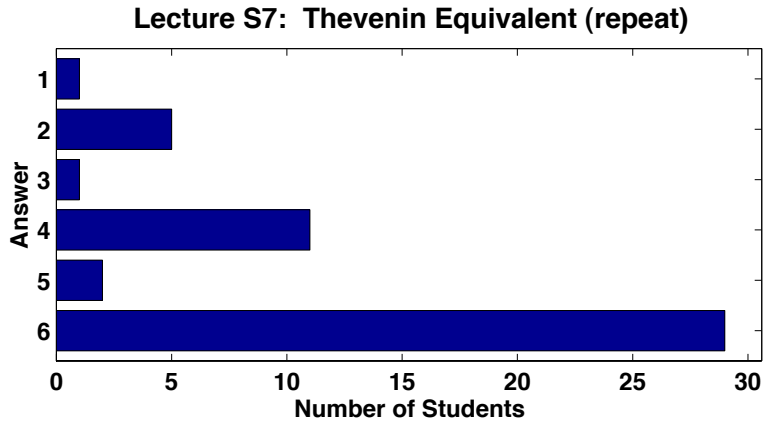


For the circuit above, the Thevenin equivalent circuit has

1. $V_T = 10$ V, $R_T = 10\ \Omega$
2. $V_T = 10$ V, $R_T = 20\ \Omega$
3. $V_T = 10$ V, $R_T = 5\ \Omega$
4. $V_T = 5$ V, $R_T = 10\ \Omega$
5. $V_T = 5$ V, $R_T = 20\ \Omega$
6. $V_T = 5$ V, $R_T = 5\ \Omega$

Thevenin Equivalent Circuit Solution





The open circuit voltage is given by

$$V_{\text{oc}} = \frac{10\ \Omega}{5\ \Omega + 10\ \Omega + 5\ \Omega} 10\ \text{V} = 5\ \text{V}$$

since the circuit is basically a voltage divider, with three resistors. Therefore,

$$V_T = V_{\text{oc}} = 5\ \text{V}$$

To find the Thevenin equivalent resistance, set all the sources to zero, and determine the resistance looking into the terminals. A voltage source of zero strength is a short circuit, so the result is that the two 5 Ω resistors are in series, forming an equivalent 10 Ω. This is in turn in parallel with the 10 Ω resistor. The equivalent resistance of two 10 Ω resistors in parallel is 5 Ω. Thus,

$$R_T = 5\ \Omega$$

The correct answer is therefore number 6. The class did much better on the second try.