SP212 Quiz 6

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1) In the figure below, $R_1 = 2.0 \, \Omega$, $R_2 = 4.5 \, \Omega$, and $R_3 = 1.5 \, \Omega$. What is the equivalent resistance between points $D$ and $E$?

\[ \frac{1}{R_{eq}} = \frac{1}{R_1} + \frac{1}{R_2} = \frac{1}{2.0 \, \Omega} + \frac{1}{4.5 \, \Omega} = 0.72 \, \Omega \]

a) 2.1 $\Omega$
b) 2.4 $\Omega$
c) 2.9 $\Omega$
d) 3.2 $\Omega$
e) 3.5 $\Omega$

For whole network, $R_{eq} = 1.38 \, \Omega + 1.5 \, \Omega = 2.9 \, \Omega$

2) In this circuit shown below, $R = 55 \, \Omega$ and $C = 2.0 \, \text{mF}$. If the capacitor is uncharged when the switch is closed, how long does it take for the capacitor to reach 75% of its maximum charge?

\[ Q_{max} = C \cdot \varepsilon \]

\[ Q = \frac{3}{4} \Rightarrow Q_{max} = \frac{3}{4} \cdot C \cdot \varepsilon = C \cdot \varepsilon \cdot (1 - e^{-t/RC}) \]

\[ \frac{3}{4} = 1 - e^{-t/RC} \]

Solving for $t$ in calculator...

\[ t = 0.15 \, \text{s} \]