1. (6 points) For the circuit below, assume the capacitor is uncharged. (A) Determine the voltage across the capacitor a very short time after the switch is closed. (B) Find the voltage across the capacitor after a long time has passed. (C) Find the charge on the capacitor after a long time has passed.

\[
\begin{align*}
\text{10.0 V} & \quad \text{5 } \Omega \quad \text{20 } \Omega \quad \text{5 } \Omega \quad \text{10 } \Omega \quad \text{C} = 50 \ \mu\text{F} \\
\end{align*}
\]

EXTRA CREDIT (4 points) Find the voltage across the 20-\(\Omega\) resistor a very short time after the switch is closed.

2. (5 points) In the circuit below, all resistors are the same. Find the voltage across the middle resistor, labeled by a circled “1”.

\[
\begin{align*}
\text{10.0 V} & \quad \text{R} \quad \text{R} \quad \text{R} \\
\end{align*}
\]

3. (5 points) In a Cathode-Ray Tube, the type used in old TVs and computer monitors, electrons are accelerated by some voltage toward a grid of wires. Most of the electrons miss the grid and go on to hit the screen. In the example diagrammed below, the accelerating voltage is 1200 V. Find the speed of the electron just after it goes through the grid.

\[
\begin{align*}
\text{1200 V} & \quad \text{e}^- \quad \text{to screen} \\
\text{filament} \quad \text{grid} \\
\end{align*}
\]
4. (6 points) In the circuit below, (A) Find the equivalent resistance seen by the battery, (B) determine the total current supplied by the battery, and (C) find the voltage drop across the 6-Ω resistor.

5. (4 points) A 1.00-meter-long piece of a certain diameter nichrome wire has a resistance of 22.0 Ω. When a battery is hooked to it, we find the there is a 6.00-volt potential between the ends of the wire. Find the average electric field inside the wire.