1. Suppose that the stock room only has 10kΩ resistors. Design a voltage divider circuit such that \(v_{\text{out}}(t)\) is always a quarter of \(v_S(t)\). You get extra points for the most economical design!

![Voltage Divider Circuit]

2. Consider the following circuits with \(n\) voltage sources and \(n+1\) resistors connected in series. Suppose that \(V_1 = V_2 = \cdots = V_n = V\) and \(R_1 = R_2 = \cdots = R_n = R\)

   (a) Find the Thevenin equivalent for the given circuit.
   (b) Find the Norton equivalent for the given circuit.
   (c) Describe the limiting behavior of the circuit when \(n\) is large.

![Series Circuit]
3. Consider the simple RC circuit shown in the figure below.

(a) Find a mathematical expression for the time it takes to charge the capacitor up to 90% of $V_S$.

(b) Sketch the voltage across the resistor $v_R(t)$ as a function of time.

4. Consider another RC circuit with a current source switched on at $t = 0$.

(a) Write the differential equation relating $v_C(t)$ and $i_S(t)$.

(b) Sketch $v_C(t)$.

Due date: **October 1** in class