Question 1: Voltage dividers

With Reference to Figure 1, write down the expressions for the voltages across R1 and R2.

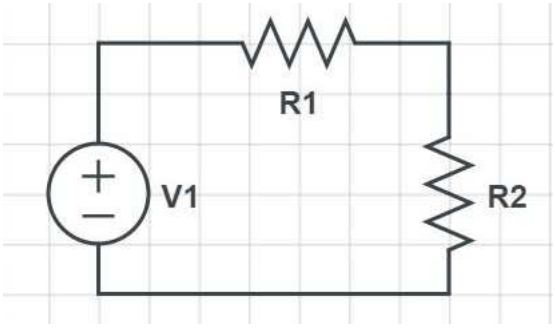

Figure 1

If V1 = 10V, R1 = 100Ω and R2 = 250Ω

a) Calculate the voltage across R1
b) Calculate the current supplied by the source
c) If we wish to replace R1 and R2 with a single resistor, what should its value be?

Question 2: Kirchoff's current laws and Resistors in parallel

Referring to Figure 2 and using the same resistor values as before,

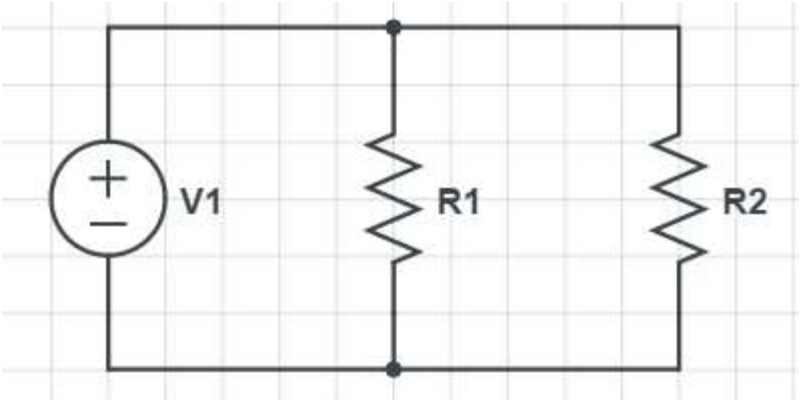

Figure 2

a) What is the total current supplied by the source now?
b) What is the voltage across R2?
c) If we wish to replace R1 and R2 with a single resistor, what should its value be?

Question 3: Series-parallel circuit

In Figure 3 below find I_o in the circuit below using basic circuit theory.

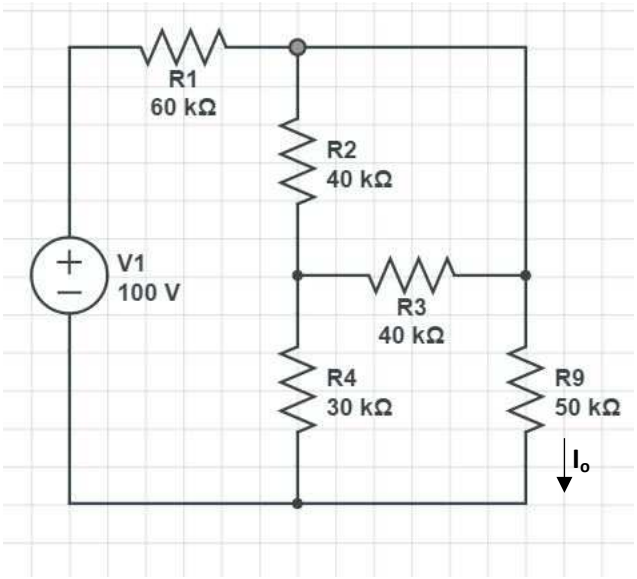

Figure 3

Question 4: Capacitors

In Figure 4, a capacitor of value C1 = 100nF and C2 = 10nF are charged to voltage V1 = 4V

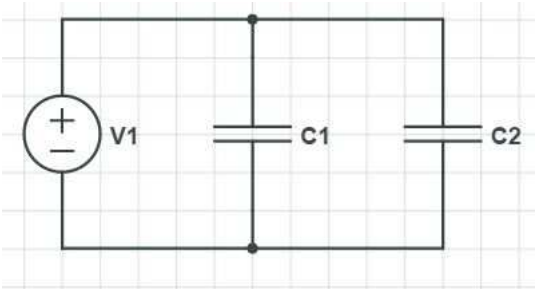

Figure 4

a) What is the charge on each capacitor?
b) Write down an expression's for the net capacitance of a number of capacitors in series and a number of capacitors in parallel.

Question 5: Charging Capacitor

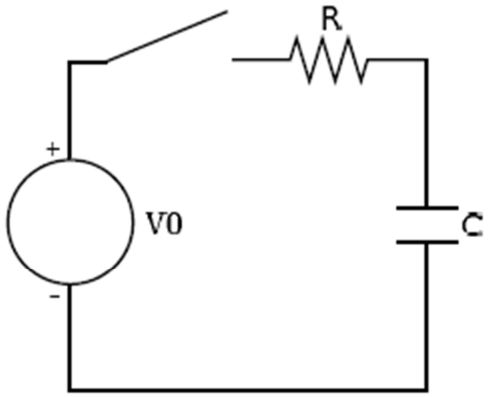

Figure 5

a) At time t = 0 a switch is closed, connecting a voltage source V0=5V through resistor R = 47k to a capacitor C = 1000µF. Sketch the voltage across the capacitor as a function of time. Show approximates times on the horizontal axis.
b) What will the voltage across the Resistor be after 100 milliseconds?
c) Calculate the 10%-90% rise time when R = 100kΩ and C = 100nF?