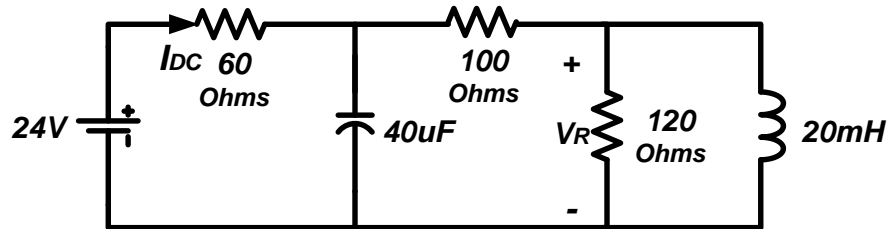


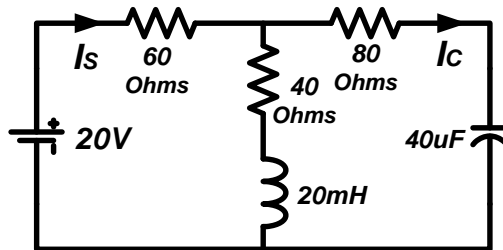
Instructions – You must submit a complete set of solutions to the problems that show all steps required to achieve the correct answer. Your solutions should appear in the numerical order of the assigned homework problems, and should be written single-sided on blank paper. Draw a box around all of the final answers for each problem.

Problem #1) Given the following DC circuit that is operating at steady-state:

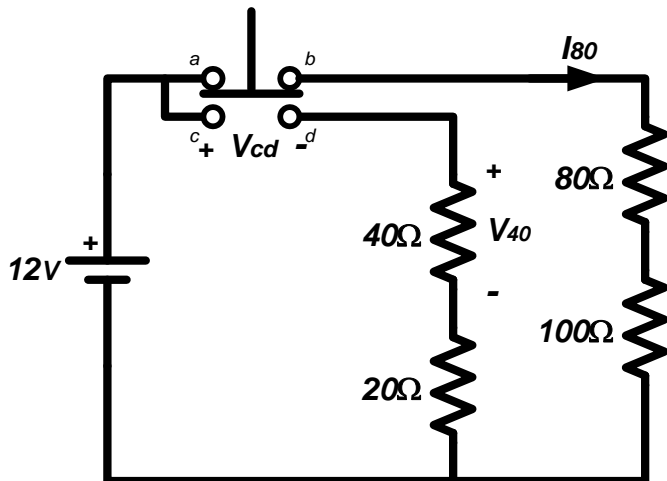


Determine  $I_{DC}$  and  $V_R$  in the circuit as shown.

Problem #2) Given the following circuit that is operating at steady-state DC, determine the currents  $I_S$  and  $I_C$  as shown in the circuit:



Problem #3) Given the following circuit that contains a combination push-button:



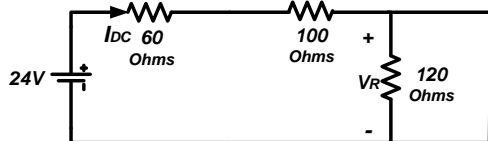
- a) Determine the **voltages**  $V_{cd}$  and  $V_{40}$  and the **current**  $I_{80}$  when the button is in its “normal” position.
- b) Determine the **voltages**  $V_{cd}$  and  $V_{40}$  and the **current**  $I_{80}$  while the button is being pressed.

**Problem T/F)** Specify whether each of the statements are **TRUE** or **FALSE**.

- \_\_\_\_\_ The *series equivalent resistance* of multiple resistors in series will always be greater than the resistance of any of the individual resistors.
- \_\_\_\_\_ *Kirchhoff's Voltage Law* states that the sum of voltages across a set of series resistors will always equal zero.
- \_\_\_\_\_ The *parallel equivalent resistance* of multiple resistors in parallel will always be greater than the resistance of any of the individual resistors.
- \_\_\_\_\_ An ideal switch in the “off” position acts like an “*open-circuit*”.
- \_\_\_\_\_ Within a circuit, *parallel resistors* must have the same current flowing through all of them.
- 
- \_\_\_\_\_ If two resistors having the same resistance value are in *parallel* with each other in an active circuit then the two resistors will have the same magnitude currents flowing through them.
- \_\_\_\_\_ According to *Kirchhoff's Current Law*, if all of the currents for a given node are defined in a direction such that they are all “entering” the node, then the sum of these currents must be zero.
- \_\_\_\_\_ Given a set of *parallel resistors*, if additional resistors are added to the parallel combination then the total equivalent resistance will decrease.
- \_\_\_\_\_ Given a circuit containing a single voltage source and one or more resistors, *current will flow “out of” the positive terminal* of the voltage source.
- \_\_\_\_\_ There is never a potential difference (voltage) across an *idea wire*.
- 
- \_\_\_\_\_ If two resistors are in *series* with each other in an active circuit then the two resistors will have the same magnitude currents flowing through them.
- \_\_\_\_\_ The *direction of the voltage rise* across a resistor will always be opposite compared to the direction of current flowing through the resistor.
- \_\_\_\_\_ Any two elements within a circuit that are connected across the same two nodes are said to be in *parallel* with each other.
- \_\_\_\_\_ A *SPDT switch* can be used in a circuit that contains a single source and two loads if is required that only one of the loads should be supplied by the source at any time .

**Answers:**

1)



Cap. → Open Ckt. at steady-state (remove from ckt.)  
 Ind. → Short Ckt. at steady-state (replace with “ideal” wire)

$V_R = 0$  volts (no voltage across an "ideal" short - ckt.)

$$I_{DC} = \frac{24V}{(60\Omega + 100\Omega)} = \frac{24}{160} = 0.15 \text{ amps}$$

2)  $I_S = 0.2$  amps,  $I_C = 0$  amps

3) a)  $V_{cd} = 12$  V  $V_{40} = 0$  V  $I_{80} = 0.0666$  A

b)  $V_{cd} = 0$  V  $V_{40} = 8$  V  $I_{80} = 0$  A

**True/False)** T, F, F, T, F, T, T, T, T, T, T, T, T, T, T, T