

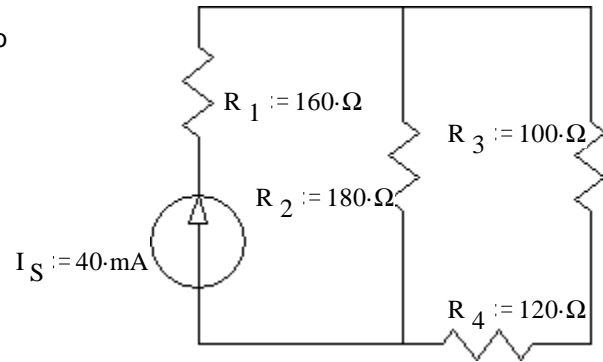
ECE 2210 / 00 homework DC6

Due: Tue, 9/12/23

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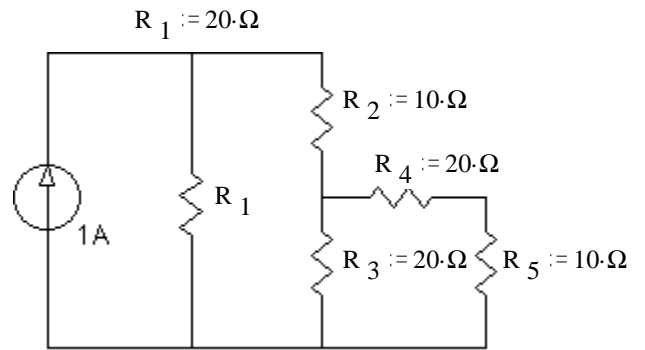
Thevenin & Norton equivalent circuits

1. For the circuit shown at right, use Thevenin's theorem to find the current through the 120- Ω resistor, R_4 .



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2. For the circuit shown, use Norton's theorem to find the value of the current in R_5 . Hint: You can find I_N either by calculation of the open circuit voltage (V_{OC}) and R_N or by direct calculation of the short-circuit current (I_{SC}), however, there is something about the values of the resistors which makes the second method easier than it would at first appear.



3. The terminal voltage of a car's battery drops from 12.5 V to 8.5 volts when starting. The starter motor draws 80 A of current.
- a) Draw the voltage-source model (Thevenin equivalent) of this battery. Include the values of V_S and R_S .

b) Draw the current-source model (Norton equivalent) of this battery. Include the values of I_S and R_S .

c) Which of these two models is more appropriate for the car battery?

d) What terminal voltage would you expect if this battery were being charged at 20 A?

Answers 1. 18·mA 2. 0.19·A
3. a) $V_S = 12.5\text{·V}$ $R_S := 0.05\text{·}\Omega$ b) $I_S = 250\text{·A}$ $R_S := 0.05\text{·}\Omega$ c) Thevenin d) 13.5·V