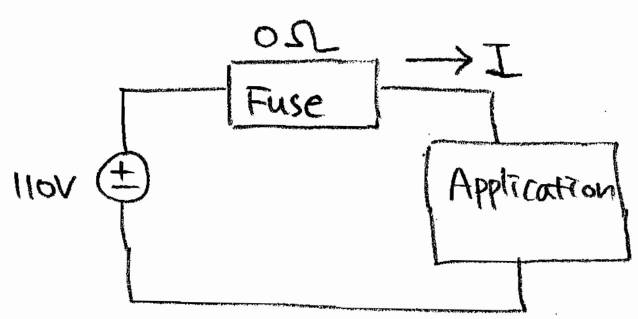
# Homework Solutions #1 ECE 376

2.26




When the power supply is operating at its maximum power dissipation level, the current is

$$I = \frac{P}{V} = \frac{500}{110} = 4.55\,A$$

Hence, we should choose the 5A fuse.

2.28 $I = 2mA$

$446.5 \leq R \leq 493.5$

We know $P = VI = I^2 R$

$\therefore (.002)^2 446.5 \leq P \leq (.002)^2 493.5$

For the resistor not to blow up no matter what the actual resistance is, power rating should be at least $(.002)^2\, 493.5 = 2mW$.

3.6 (a) From KCL, the sum of the currents entering a node should be zero. Applying this, we have

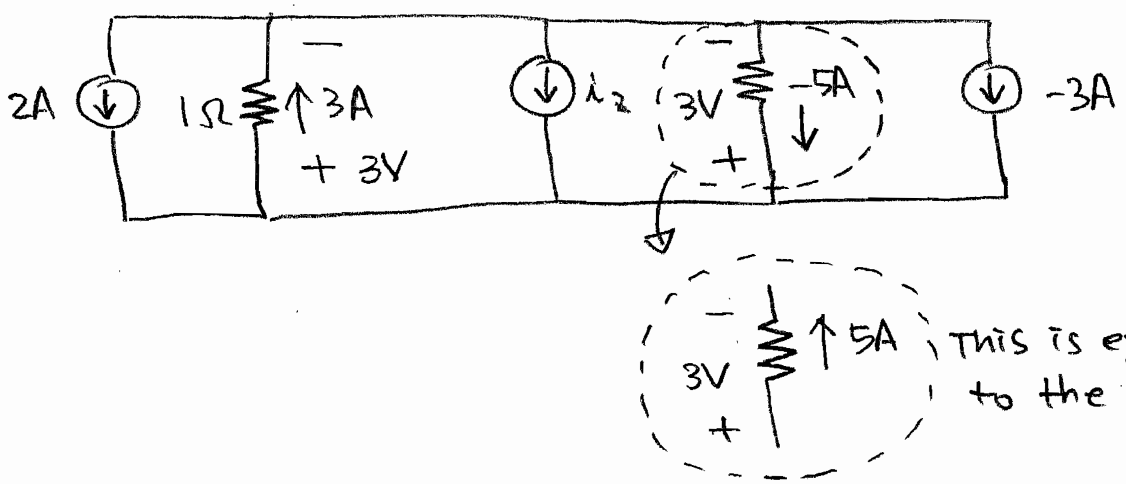
$$(-2) + 3 - i_z - (-5) - (-3) = 0.$$

$$\Rightarrow i_z = 9\ A$$

(b) The voltage across the 1Ω resistor is

$$V = IR = 3 \cdot 1 = 3V$$

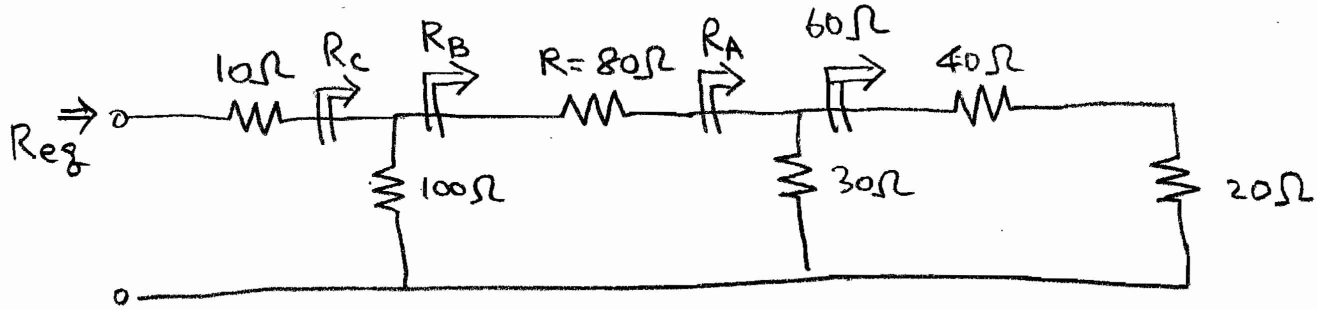
Since the current flows upward, the bottom node has higher voltage than the top node.




This is equivalent to the above.

From Ohm's law, $R = \frac{V}{I} = \frac{5}{3}\ \Omega$.

3.59(a)



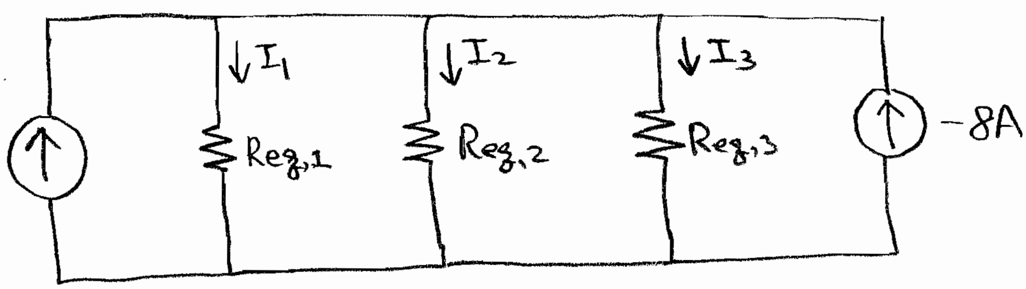

$$R_A = 60\Omega \parallel 30\Omega = \frac{1}{\frac{1}{60}+\frac{1}{30}} = 20\Omega$$

$$R_B = R_A + 80 = 20 + 80 = 100\Omega$$

$$R_C = R_B \parallel 100\Omega = \frac{1}{\frac{1}{100}+\frac{1}{100}} = 50\Omega$$

$$R_{eq} = 10 + R_C = 10 + 50 = 60\Omega$$

3.69 In order to use the current division rule given in Eq.[14] on page 59, we should know the equivalent resistance of each path.




$$R_{eq,1} = 10 + 15 = 25\Omega$$

$$R_{eq,2} = 10\Omega$$

$$R_{eq,3} = (20\Omega \parallel 60\Omega) + 22\Omega + (50\Omega \parallel 30\Omega) = 55.75\Omega$$

$$I_1 = \frac{\frac{1}{R_{eq,1}}}{\frac{1}{R_{eq,1}}+\frac{1}{R_{eq,2}}+\frac{1}{R_{eq,3}}} = 0.2533\text{ A}$$ (c.f. Eq.[14])