# Kirchoff's laws, Ohm's Law, and Circuit Analysis

# Circuit analysis

- To analyse a circuit means to find all the unknown values of voltage, current, and resistance.

- Use a combination of equivalent resistance, Kirchoff's laws, and Ohm's Law.

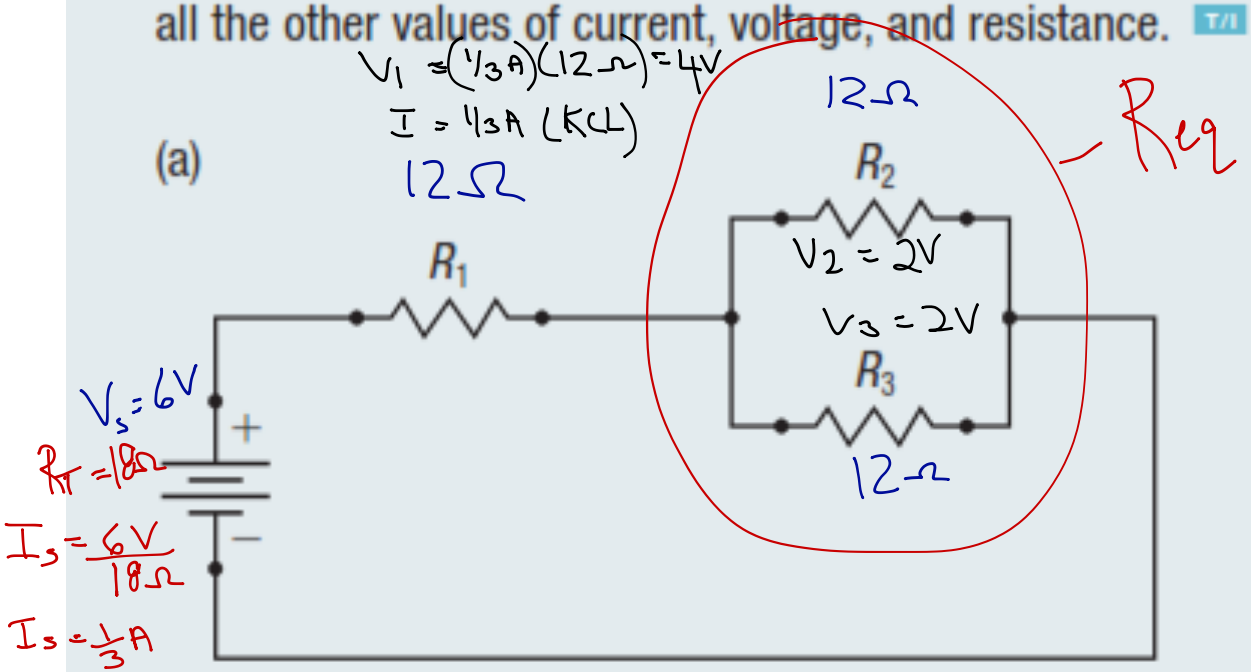
# Circuit analysis Example

1. For each of the circuit diagrams below, the source has a voltage of 6.0 V. Each resistor has resistance 12.0 Ω. Find all the other values of current, voltage, and resistance.

$V_1 = (1/3\,A)(12\,\Omega) = 4V$

$I = 1/3\,A$ (KCL)

(a)





| | V | I | R |
|---|---|---|---|
| Source | 6V | 1/3 A | 18Ω |
| 1 | 4V | 1/3 A | 12Ω |
| 2 | 2V | 1/6 A | 12Ω |
| 3 | 2V | 1/6 A | 12Ω |

$$I_2 = I_3 = \frac{2V}{12\Omega} = \frac{1}{6}A$$

$R_T = 12\Omega + R_{eq}$

$R_T = 12\Omega + 6\Omega$

$R_T = 18\Omega$

$\frac{1}{R_{eq}} = \frac{1}{12\Omega} + \frac{1}{12\Omega}$

$\frac{1}{R_{eq}} = 2/12 = \frac{1}{6\Omega}$

$R_{eq} = 6\Omega$

$R_1 = \frac{2.5V}{0.2A} = 12.5\Omega$

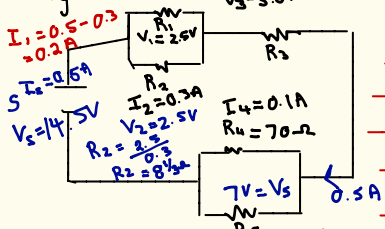
$R_3 = \frac{5V}{0.5A}$

$R_3 = 10\Omega$

$I_3 = 0.5A$

$V_3 = 5.0V$

Pg 535 #4





| | V | I | R |
|---|---|---|---|
| Source | 14.5V | 0.5A | 29Ω |
| 1 | 2.5V | 0.2A | 12.5Ω |
| 2 | 2.5V | 0.3A | $8\frac{1}{3}\Omega$ |
| 3 | 5.0V | 0.5A | 10Ω |
| 4 | 7V | 0.1A | 70Ω |
| 5 | 7V | 0.4A | 17.5Ω |
| | | | |

$V_4 = (0.1A)(70\Omega)$ $(0.5A - 0.1A)$

$V_4 = 7V$

$V_4 = V_5 = 7V$

$R_5 = \frac{V_5}{I_5}$

$= \frac{7V}{0.4A}$

$R_5 = 17.5\Omega$

$V_S = 2.5V + 5V + 7V$

$V_S = 14.5V$

$R_T = \frac{14.5V}{0.5A}$

$R_T = 29\Omega$

# Work

- Read 11.7, 11.8, and 11.9
- ~~Pg. 527 #2~~
- ~~Pg. 529 #2~~
- ~~Pg. 530 #5~~
- Pg. 535 #1b, c, d #2, #3

Quiz Tomorrow

Circuits

V

I

R