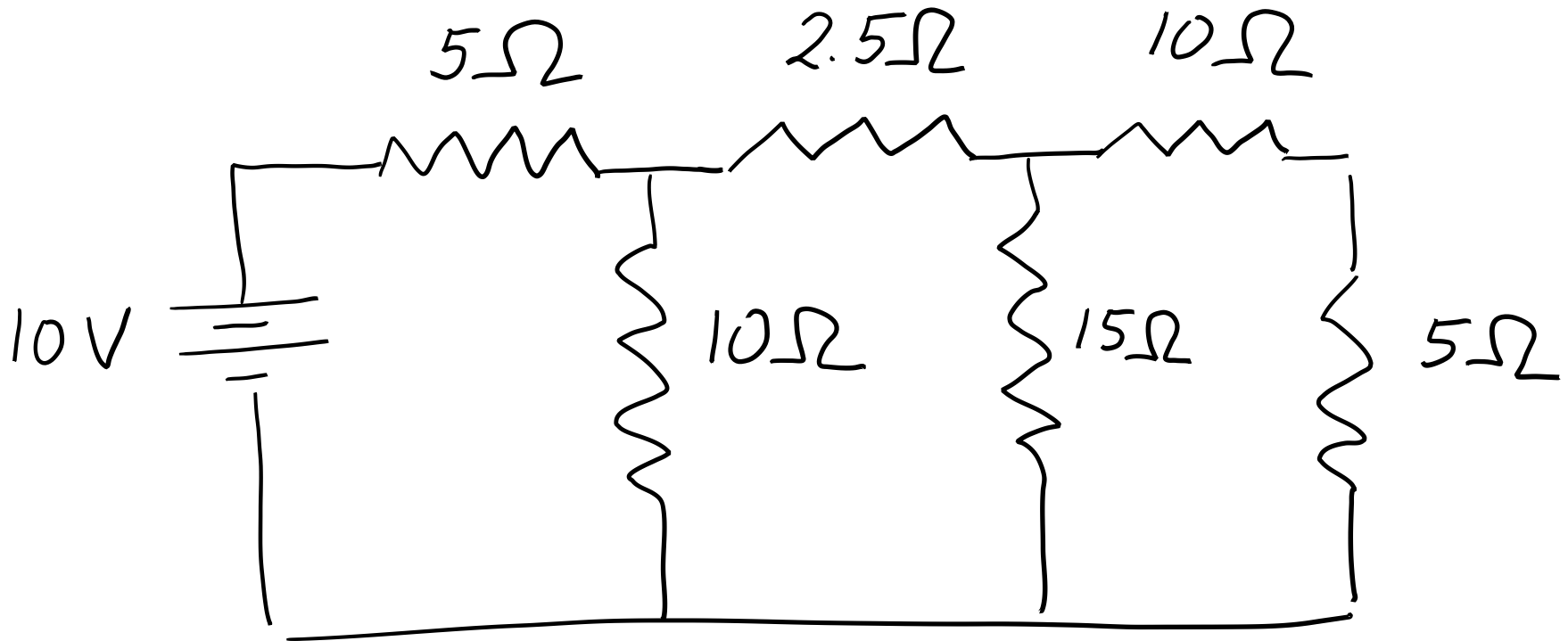


# Lecture 18:

## Resistor circuits - continued

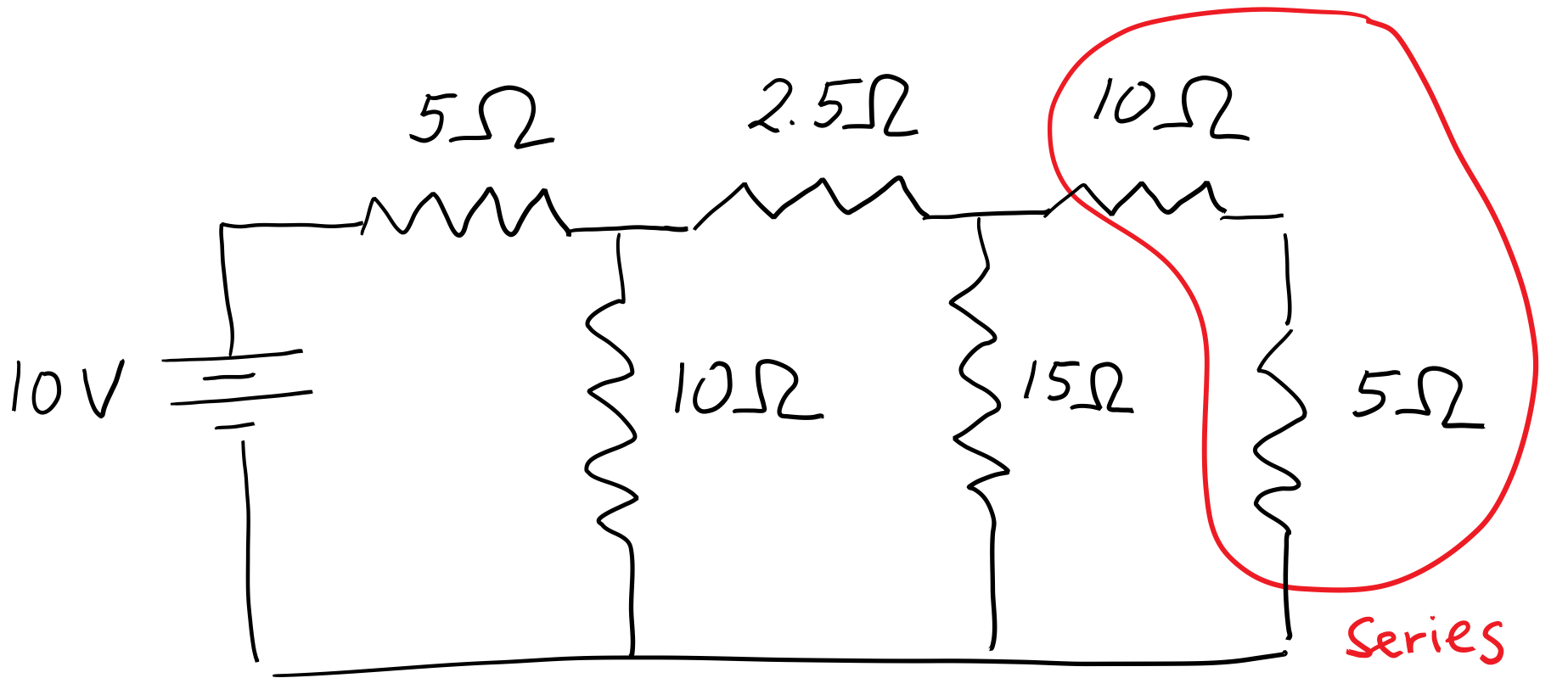
- Complex circuit example

## Example for complex circuit

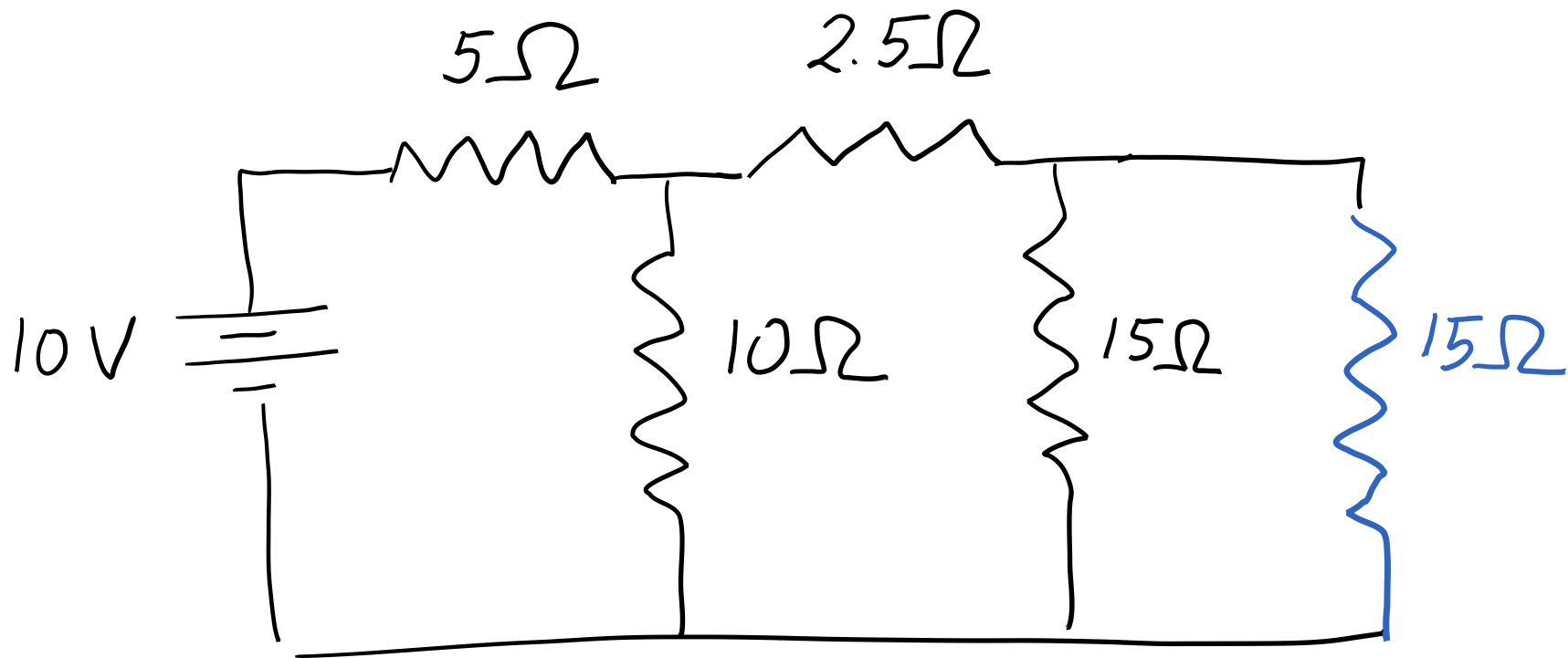


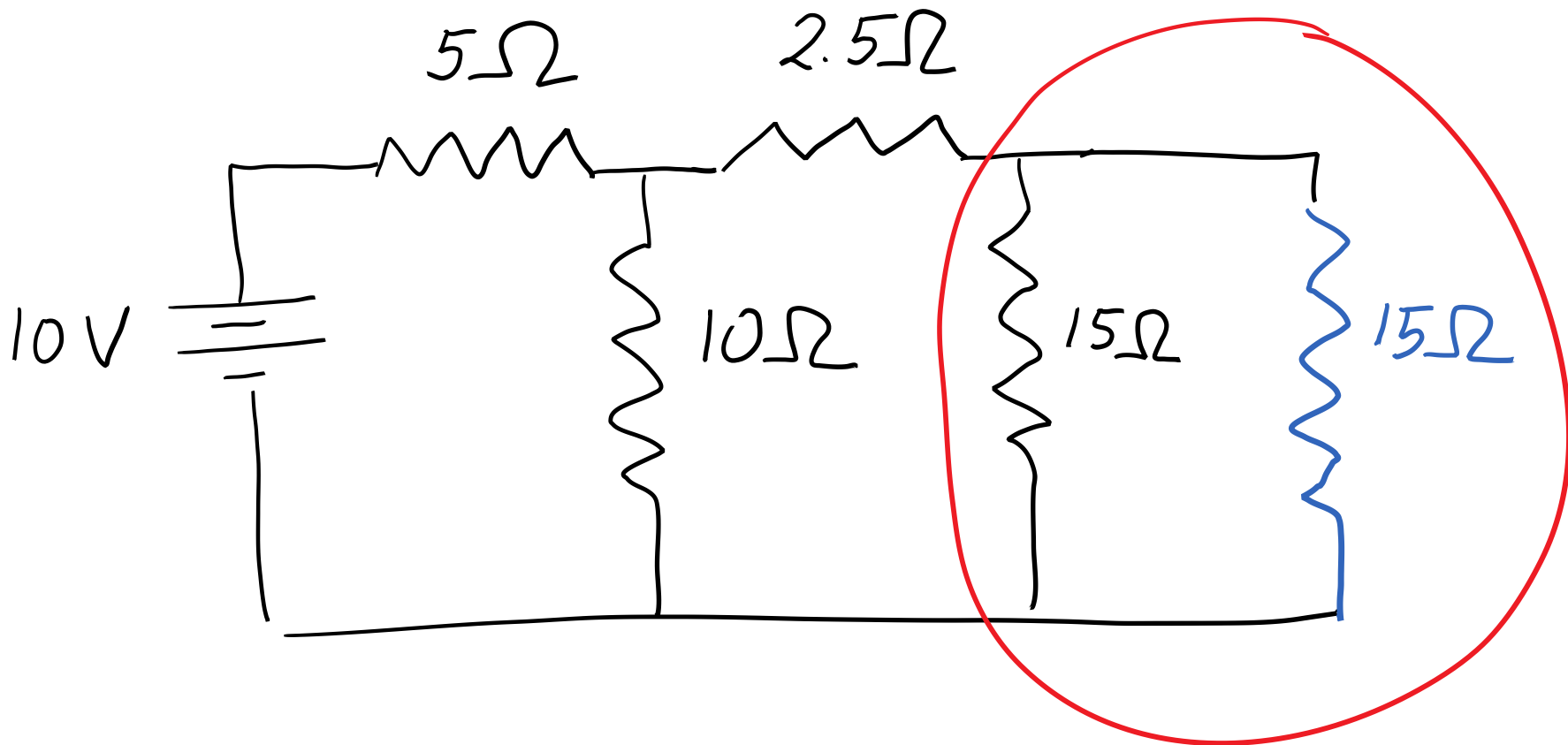
Find:

- equivalent resistance
- current and voltage drop for each resistor



$$10\Omega + 5\Omega = 15\Omega$$

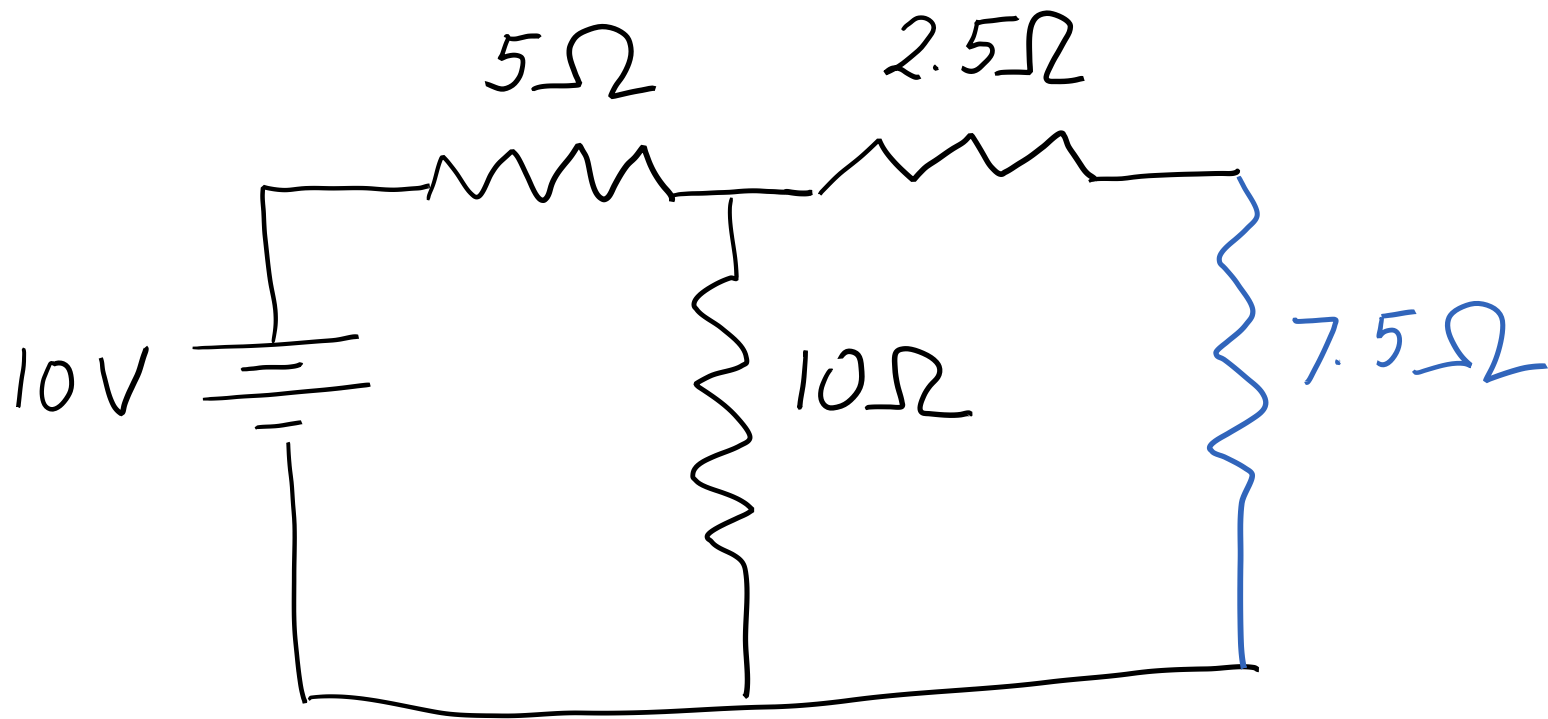


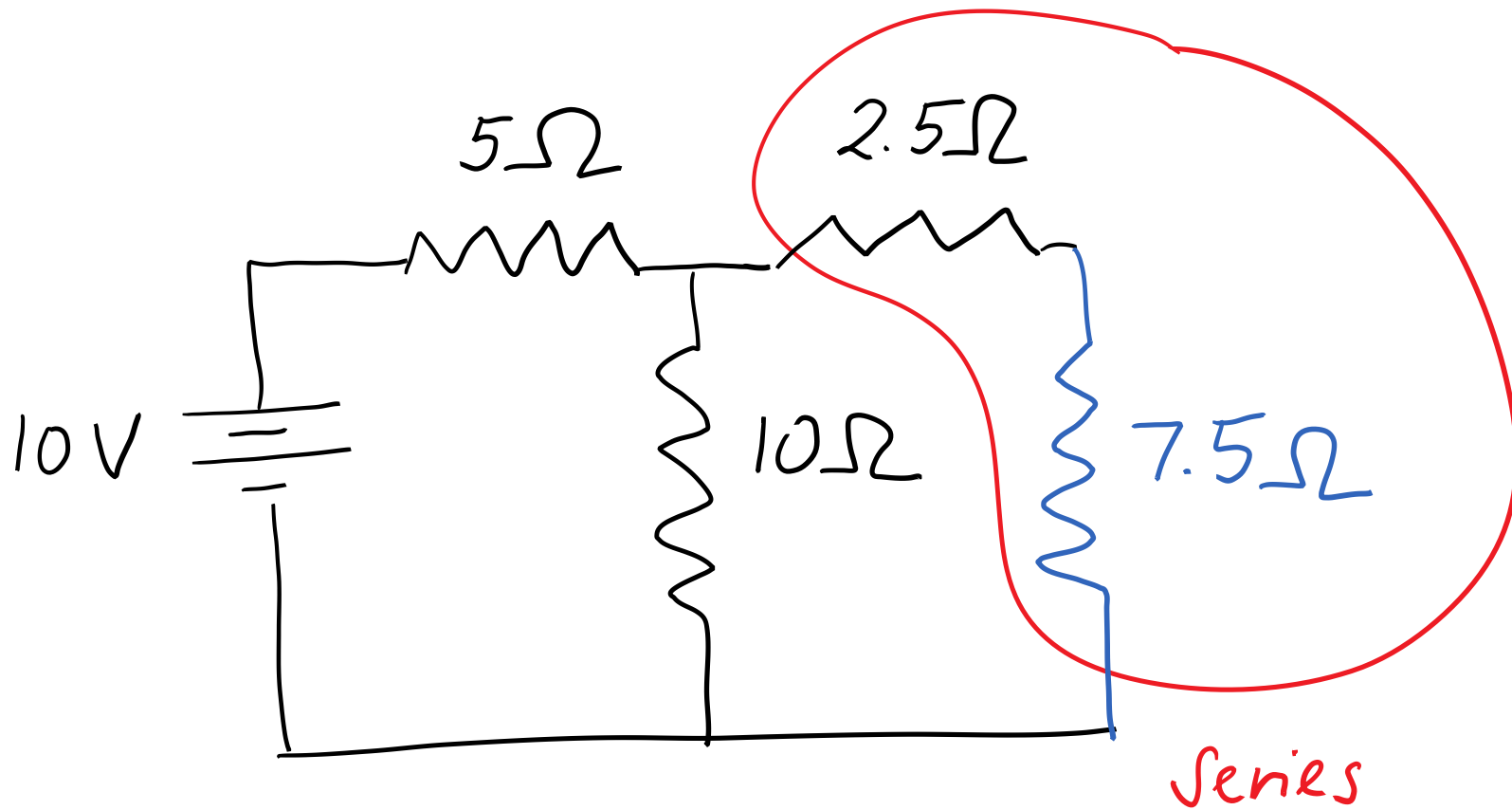


parallel

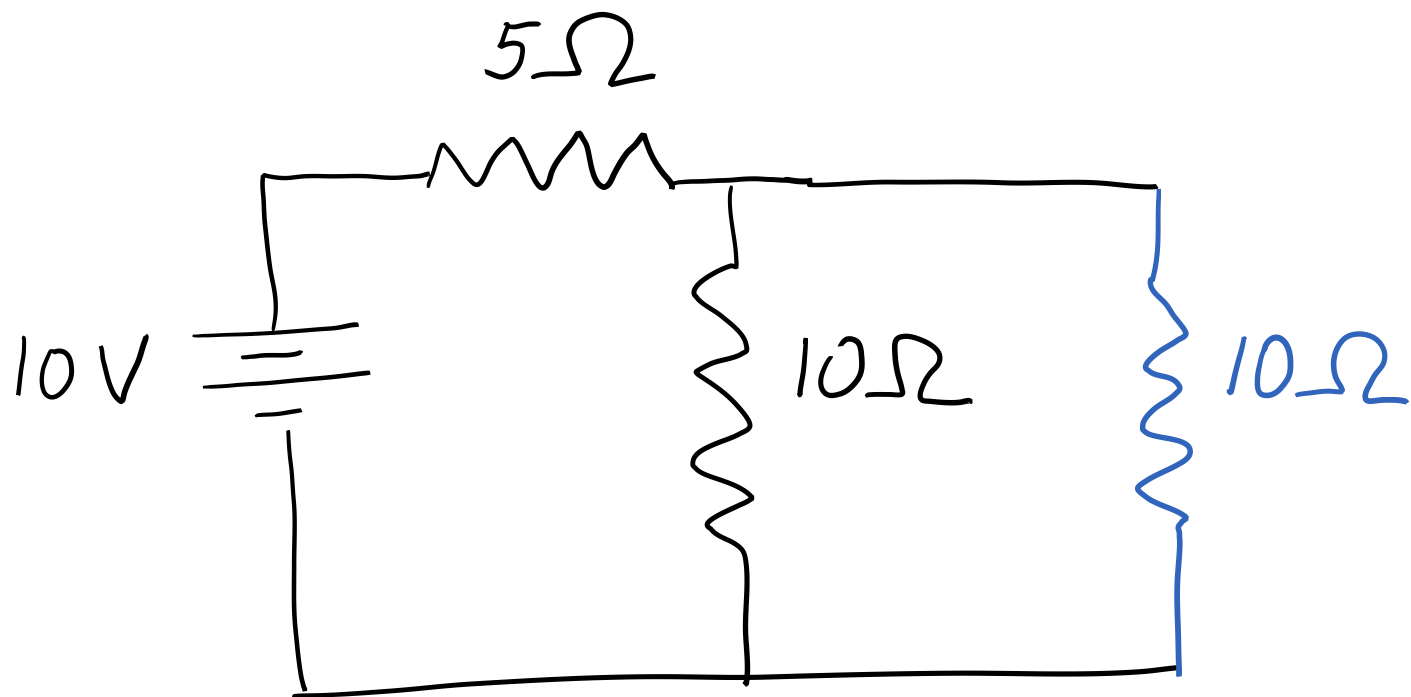
$$\frac{1}{15\Omega} + \frac{1}{15\Omega} = \frac{2}{15\Omega}$$

$$R_{eq} = 7.5\Omega$$

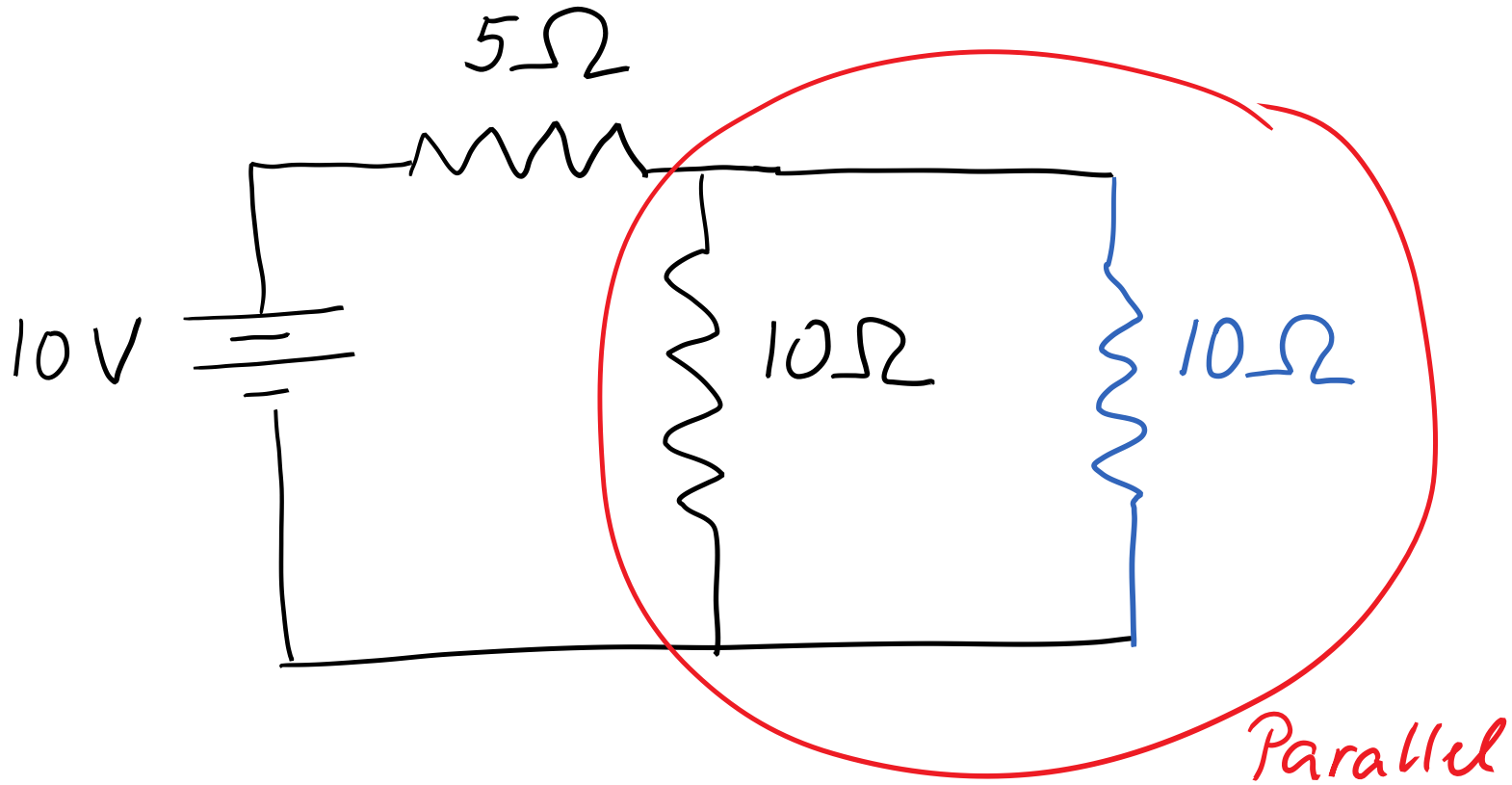




$$2.5\Omega + 7.5\Omega = 10\Omega$$

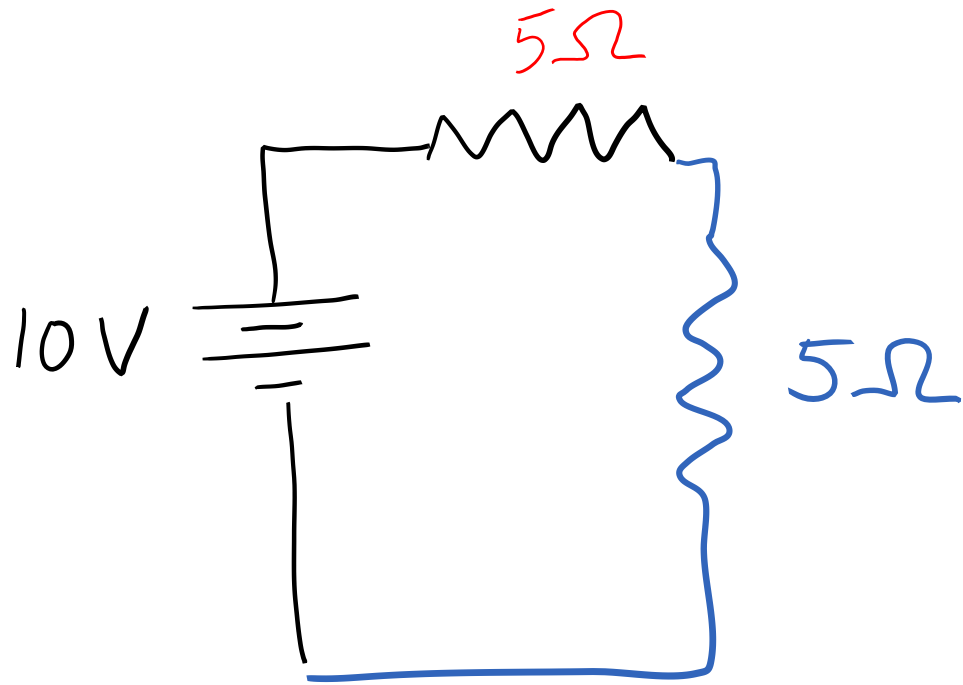


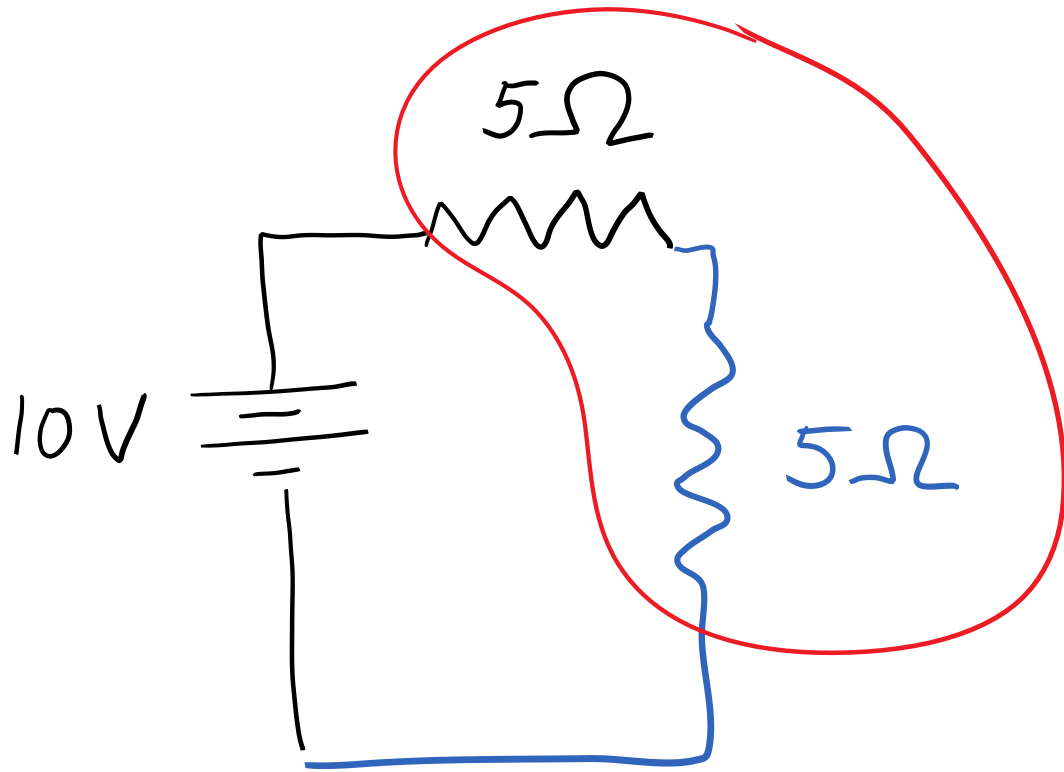




$$\frac{1}{10\Omega} + \frac{1}{10\Omega} = \frac{2}{10\Omega}$$

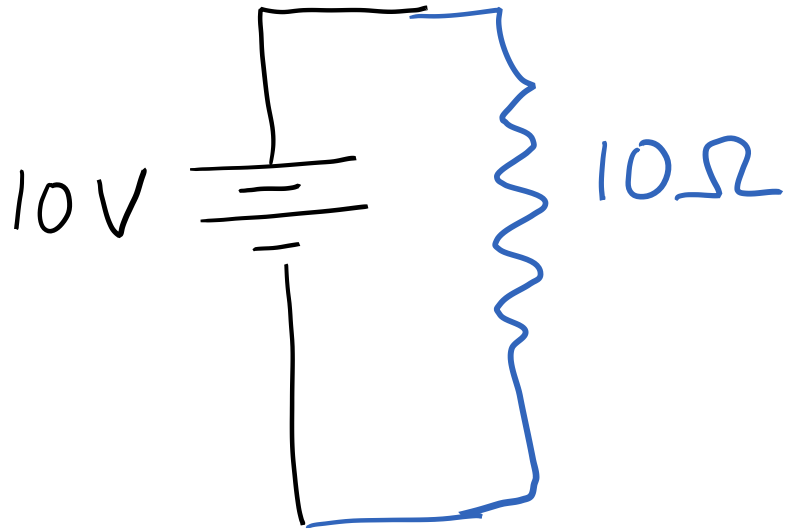
$$R_{eq} = 5\Omega$$





*series*

$$5\Omega + 5\Omega = 10\Omega$$

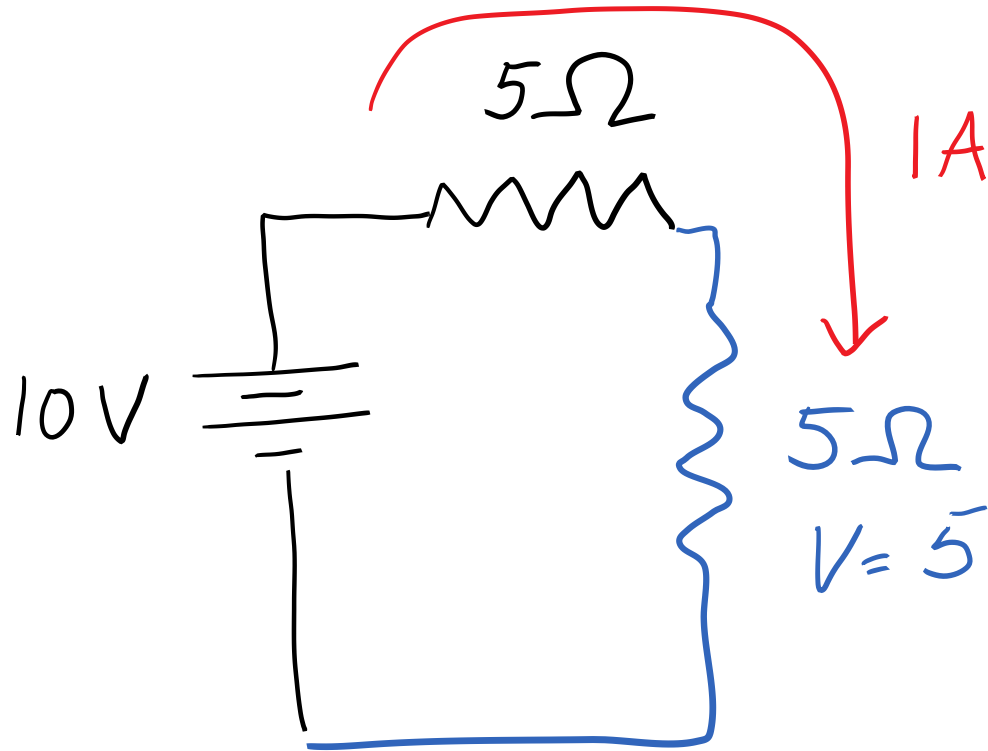


$$R_{eq} = 10\Omega$$

$$I = \frac{10V}{10\Omega} = 1A$$

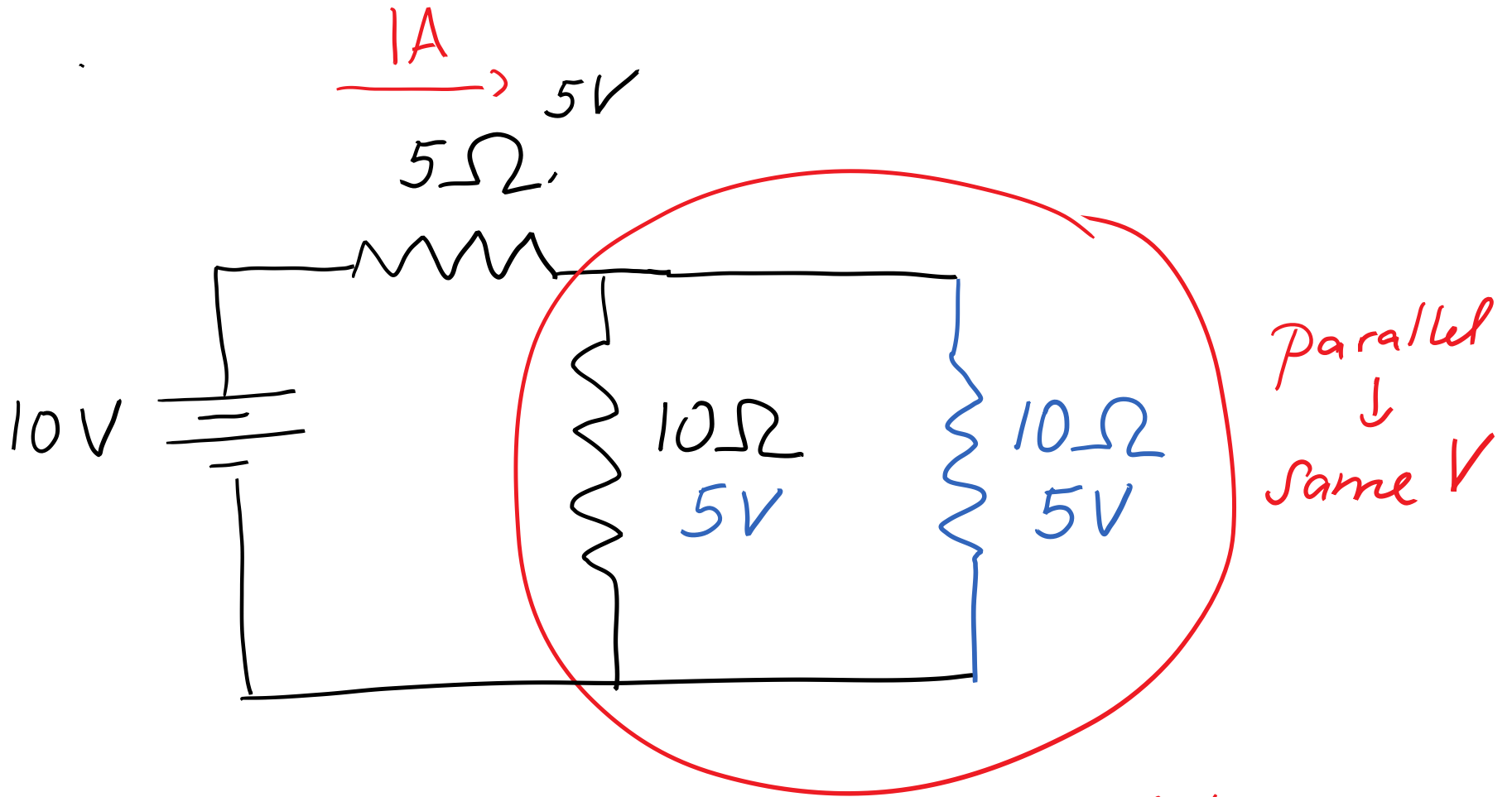
total current

$$V = 5\Omega \cdot 1A = 5V$$



$$5\Omega$$

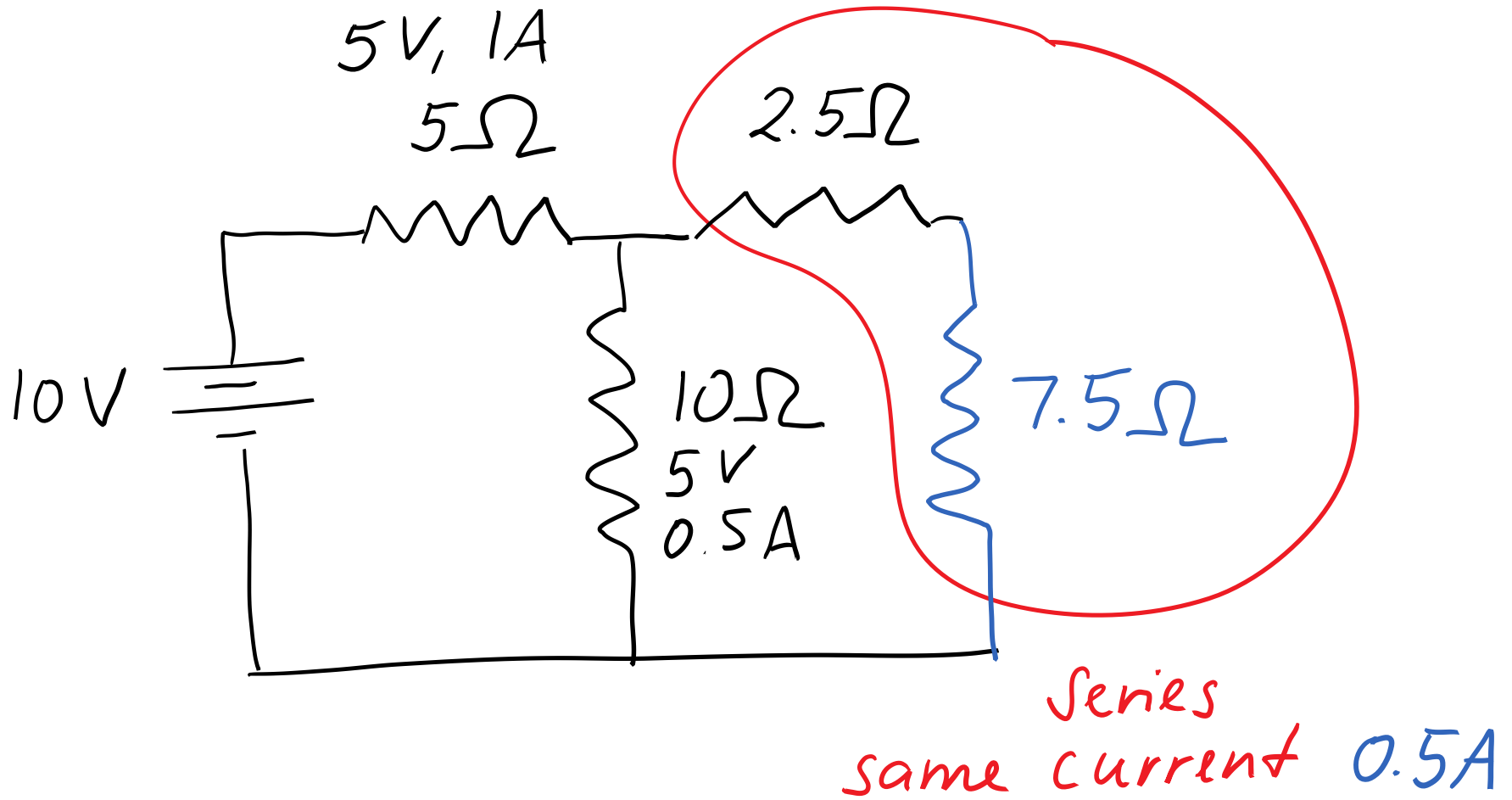
$$V = 5\Omega \cdot 1A = 5V$$

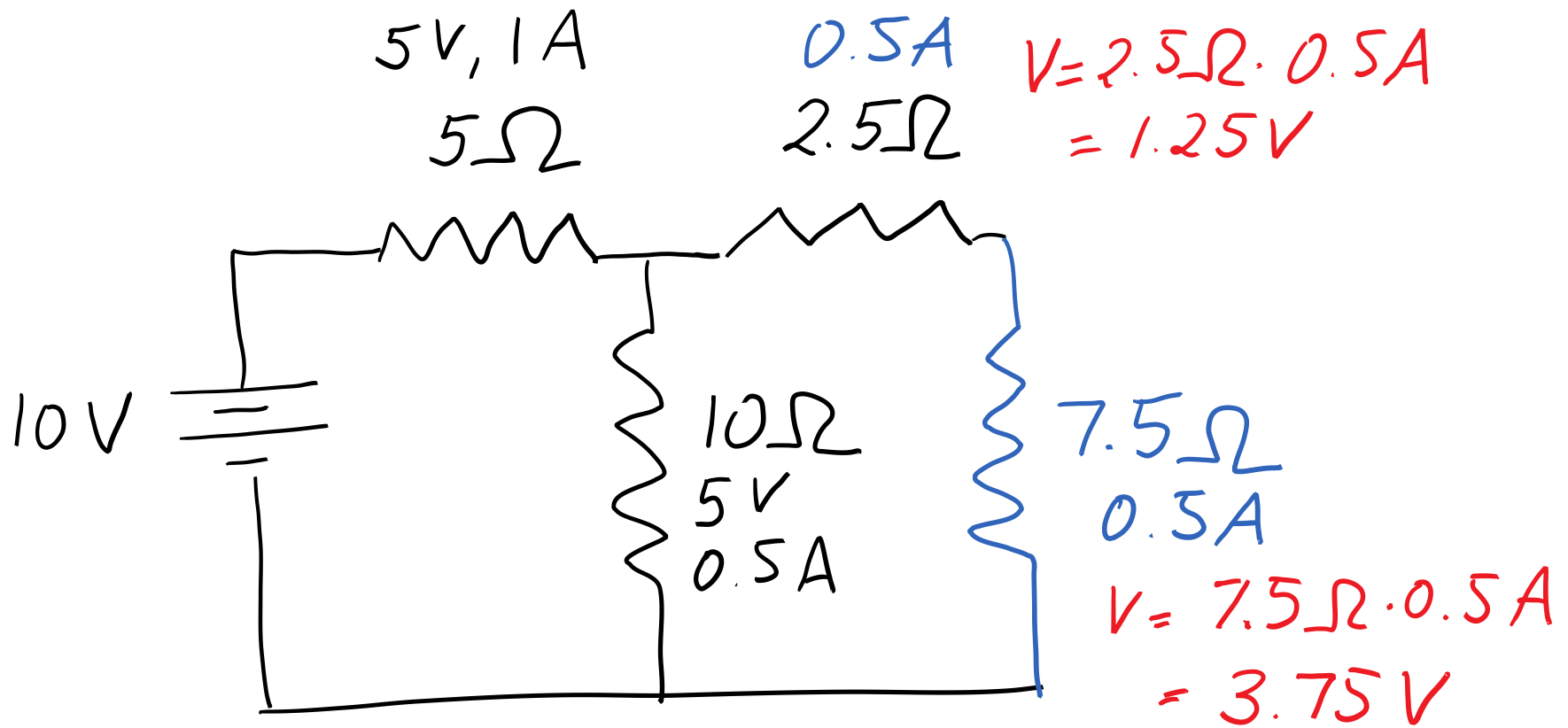


Current splits

$$\text{for each: } I = \frac{5V}{10\Omega} = 0.5A$$

Same R  $\Rightarrow$  1A current splits in equal parts

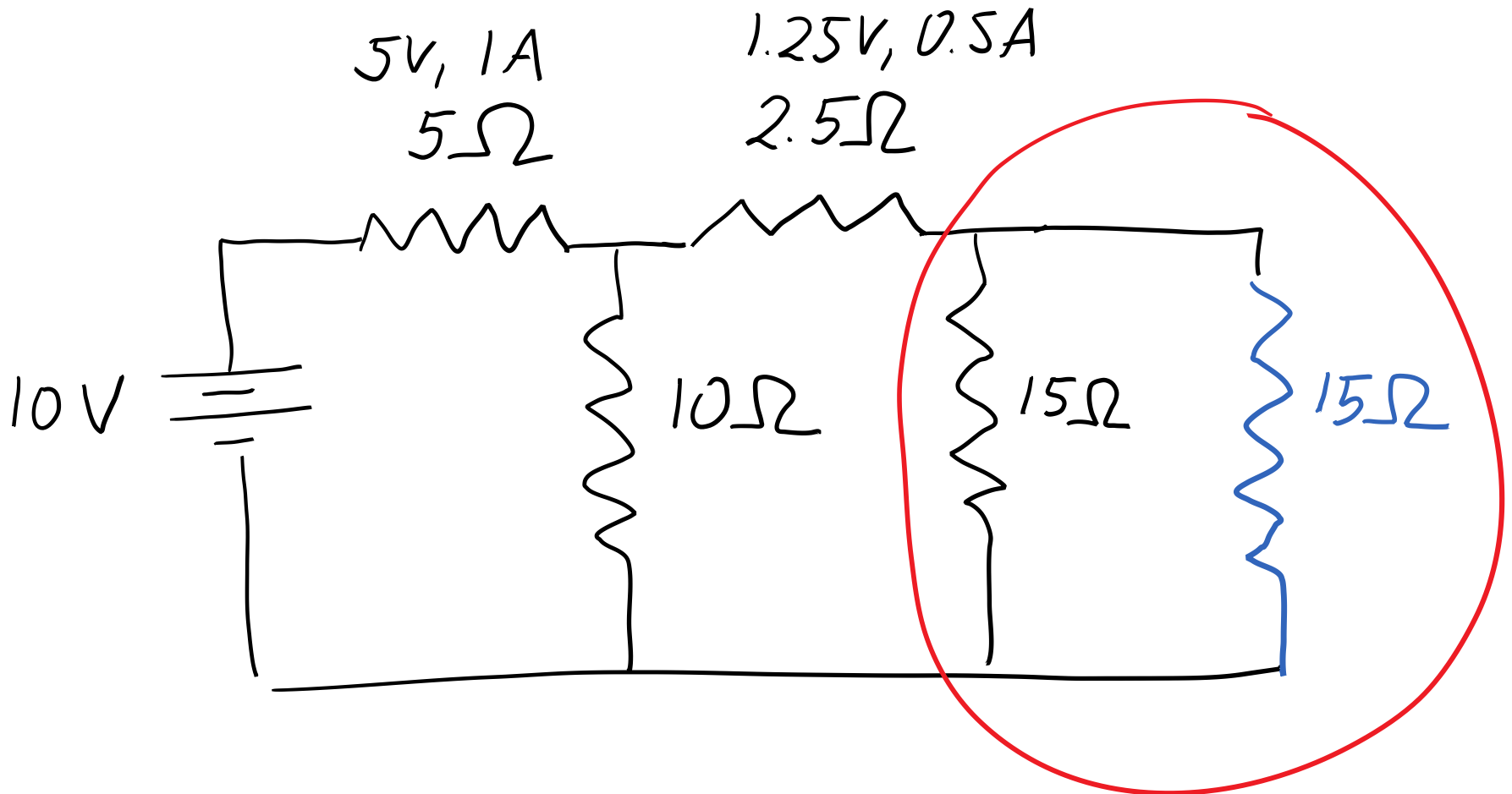




Check:  $1.25V + 3.75V = 5V$

Voltage drop is split unevenly between resistors because  $R$  are different



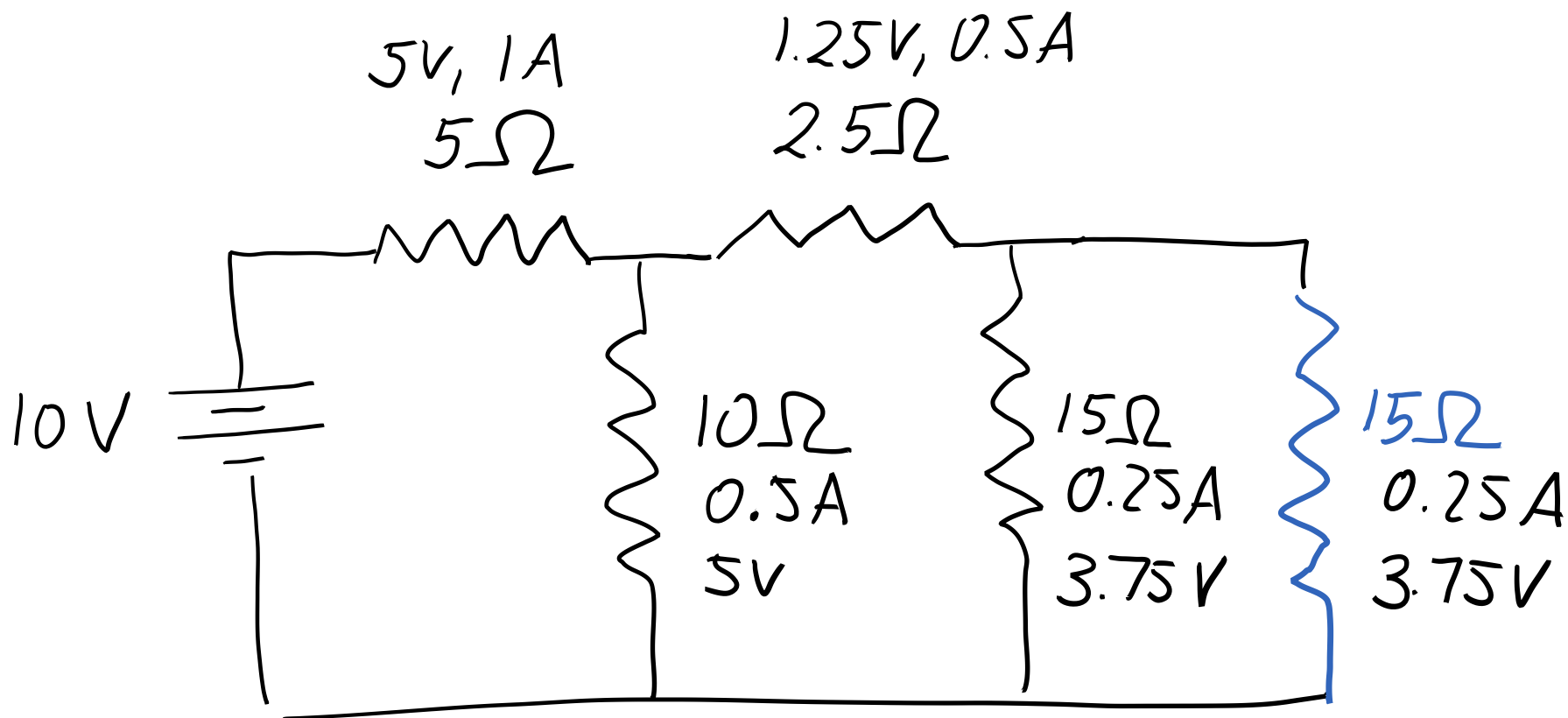


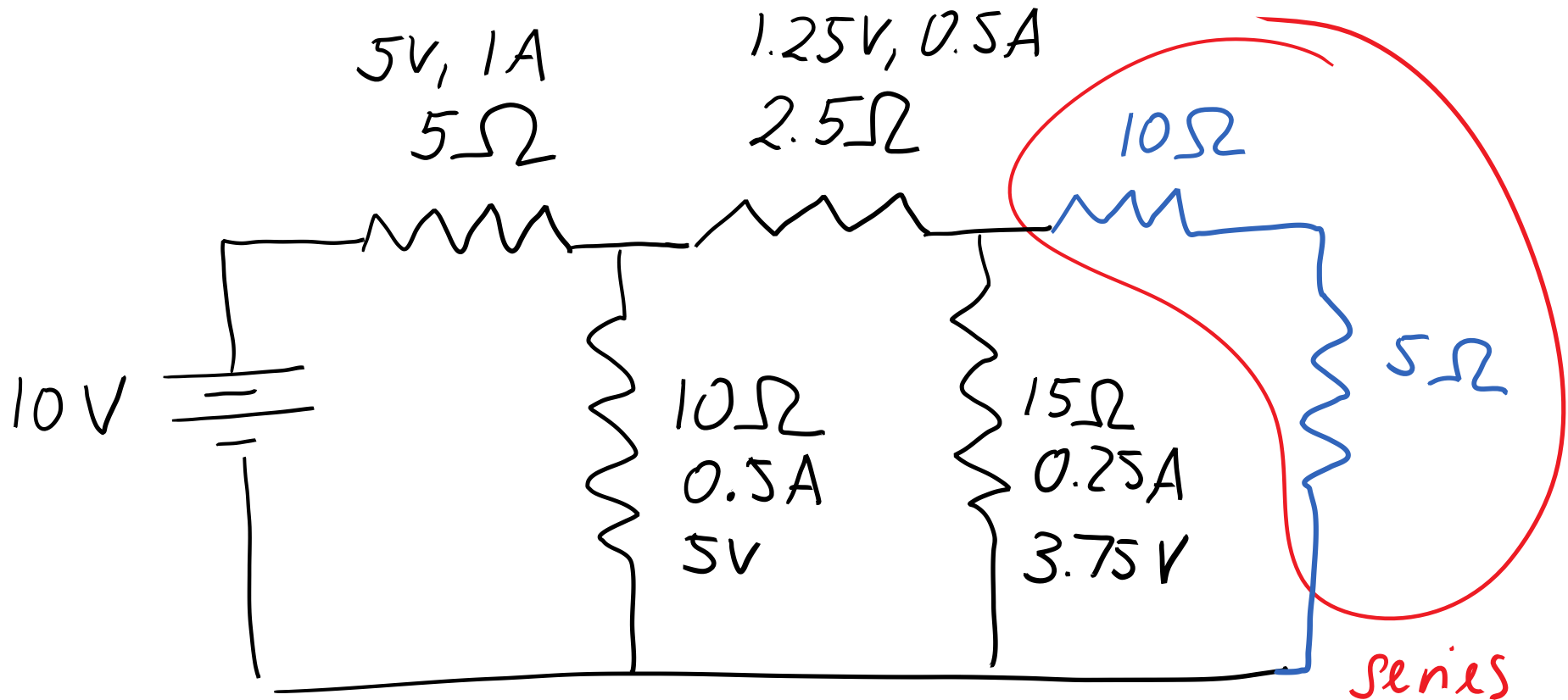
parallel

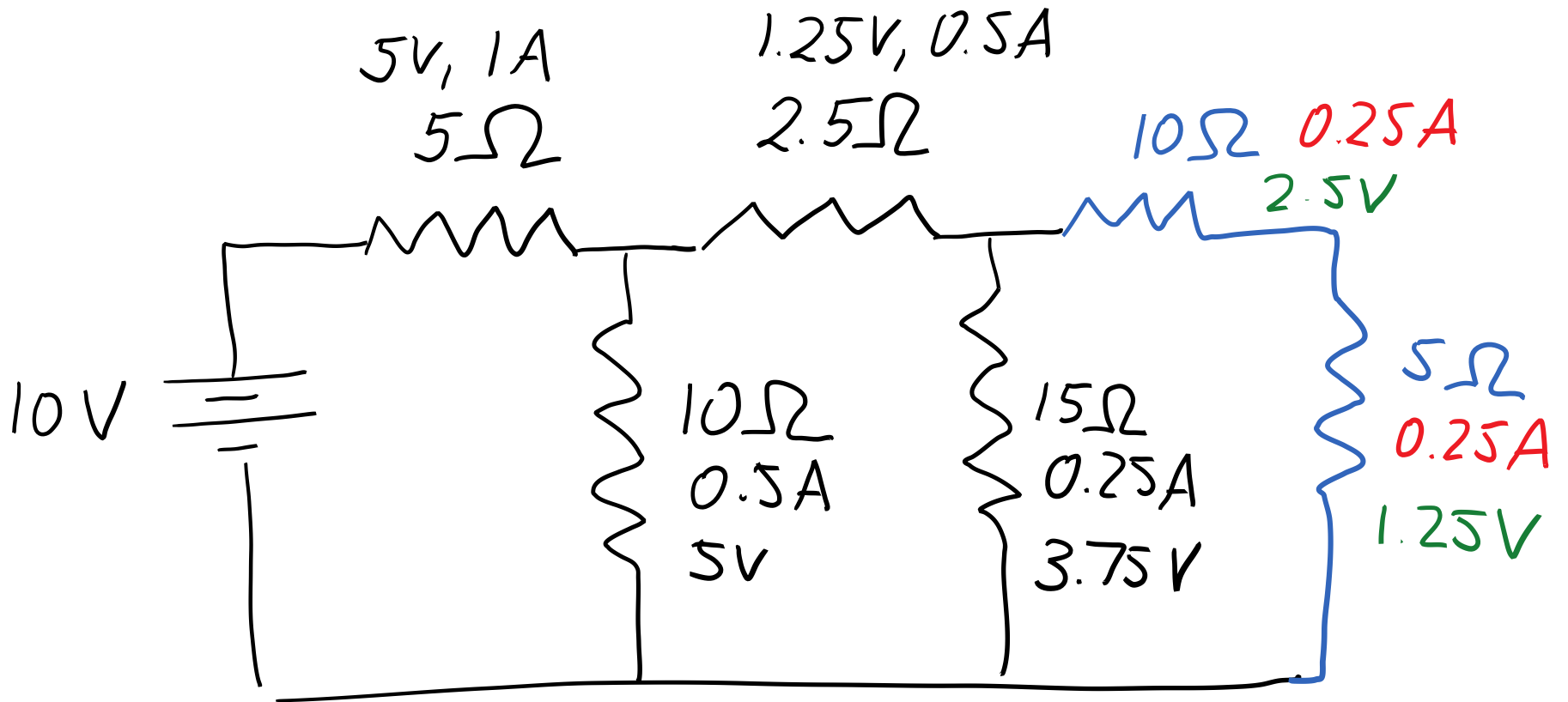
same  $V = 3.75V$

$$I = \frac{3.75V}{15\Omega} = 0.25A$$

Current of 0.5 A splits evenly between identical resistors







$$V_{10\Omega} = 10\Omega \cdot 0.25A = 2.5V$$

$$V_{5\Omega} = 5\Omega \cdot 0.25A = 1.25V$$

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check: 3.75V