

## Opgave 2.1

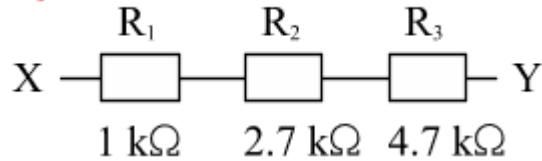
$$R_{1\_1} := 1\text{k}\Omega$$

$$R_{2\_1} := 2.7\text{k}\Omega$$

$$R_{3\_1} := 4.7\text{k}\Omega$$

$$R_{XY\_1} := R_{1\_1} + R_{2\_1} + R_{3\_1} = 8.4\text{k}\Omega$$

Fig. 2.1



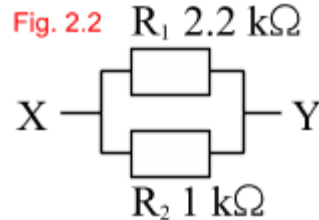
## Opgave 2.2

$$R_{1\_2} := 2.2\text{k}\Omega$$

$$R_{2\_2} := 1\text{k}\Omega$$

$$R_{XY\_2} := \frac{R_{1\_2} \cdot R_{2\_2}}{R_{1\_2} + R_{2\_2}} = 687.5 \Omega$$

Fig. 2.2



## Opgave 2.3

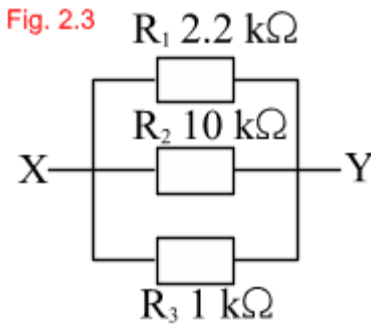
$$R_{1\_3} := 2.2\text{k}\Omega$$

$$R_{2\_3} := 10\text{k}\Omega$$

$$R_{3\_3} := 1\text{k}\Omega$$

$$R_{XY\_3} := \frac{1}{\frac{1}{R_{1\_3}} + \frac{1}{R_{2\_3}} + \frac{1}{R_{3\_3}}} = 643.275 \Omega$$

Fig. 2.3



## Opgave 2.4

R1 og R2 regnes sammen som parallel og R3 og R4 regnes sammen som parallel, så vi kommer frem til følgende kredsløb



$$R_{1\_4} := 1\text{k}\Omega$$

$$R_{2\_4} := 1\text{k}\Omega$$

$$R_{3\_4} := 3.3\text{k}\Omega$$

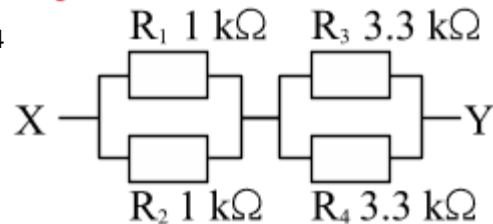
$$R_{4\_4} := 3.3\text{k}\Omega$$

$$R_{12\_4} := \frac{R_{1\_4} \cdot R_{2\_4}}{R_{1\_4} + R_{2\_4}} = 500 \Omega$$

$$R_{34\_4} := \frac{R_{3\_4} \cdot R_{4\_4}}{R_{3\_4} + R_{4\_4}} = 1.65 \text{k}\Omega$$

$$R_{XY\_4} := R_{12\_4} + R_{34\_4} = 2.15 \text{k}\Omega$$

Fig. 2.4



Modstande, strømme og spændinger benævnes efter modstands nummer og opgave nummer, så strømmen i modstand R<sub>3</sub> i Opgave 2.4 kommer til at hedde I<sub>3\_4</sub>

### Opgave 2.5

R1 og R2 regnes sammen som parallel herefter regnes R4 til som en serieforbindelse, og til sidst regnes R3 sammen som parallel med resultatet af de andre modstande

$$R_{1\_5} := 2.7\text{k}\Omega$$

$$R_{2\_5} := 5.6\text{k}\Omega$$

$$R_{12\_5} := \frac{R_{1\_5} \cdot R_{2\_5}}{R_{1\_5} + R_{2\_5}} = 1.822\text{ k}\Omega$$

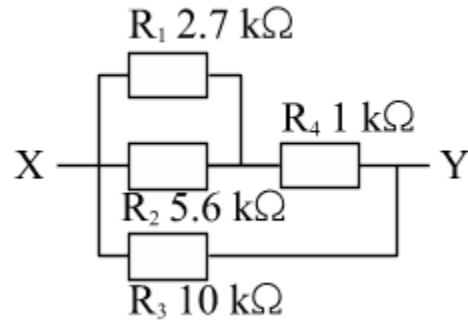
$$R_{4\_5} := 1\text{k}\Omega$$

$$R_{124\_5} := R_{12\_5} + R_{4\_5} = 2.822\text{ k}\Omega$$

$$R_{3\_5} := 10\text{k}\Omega$$

$$R_{XY\_5} := \frac{R_{124\_5} \cdot R_{3\_5}}{R_{124\_5} + R_{3\_5}} = 2.201\text{ k}\Omega$$

Fig. 2.5



### Opgave 3.1

$$U_{XY} := 20\text{V}$$

$$I_{-1} := \frac{U_{XY}}{R_{XY\_1}} = 2.381\text{ mA}$$

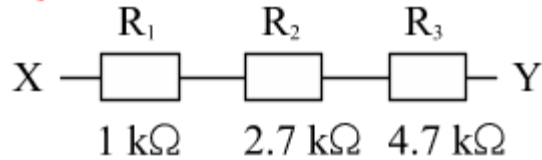
$$U_{1\_1} := R_{1\_1} \cdot I_{-1} = 2.381\text{ V}$$

$$U_{2\_1} := R_{2\_1} \cdot I_{-1} = 6.429\text{ V}$$

$$U_{3\_1} := R_{3\_1} \cdot I_{-1} = 11.19\text{ V}$$

Kontrol af beregninger:  $U_{1\_1} + U_{2\_1} + U_{3\_1} = 20\text{ V}$

Fig. 2.1



### Opgave 3.2

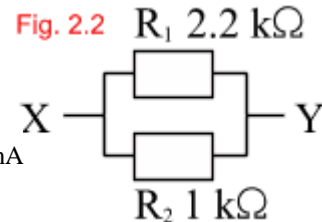
$$I_{1\_2} := \frac{U_{XY}}{R_{1\_2}} = 9.091\text{ mA}$$

$$I_{2\_2} := \frac{U_{XY}}{R_{2\_2}} = 20\text{ mA}$$

Kontrol af beregninger:

$$I_{XY\_2} := \frac{U_{XY}}{R_{XY\_2}} = 29.091\text{ mA}$$

$$I_{1\_2} + I_{2\_2} = 29.091\text{ mA}$$



## Opgave 3.3

$$I_{1\_3} := \frac{U_{XY}}{R_{1\_3}} = 9.091 \text{ mA}$$

$$I_{2\_3} := \frac{U_{XY}}{R_{2\_3}} = 2 \text{ mA}$$

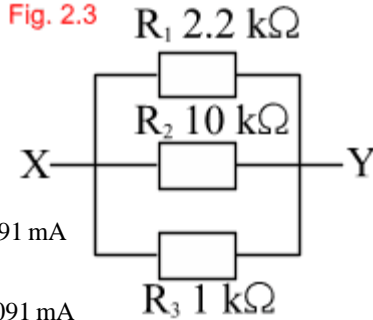
$$I_{3\_3} := \frac{U_{XY}}{R_{3\_3}} = 20 \text{ mA}$$

Kontrol af beregninger:

$$I_{XY\_3} := \frac{U_{XY}}{R_{XY\_3}} = 31.091 \text{ mA}$$

$$I_{1\_3} + I_{2\_3} + I_{3\_3} = 31.091 \text{ mA}$$

Fig. 2.3



## Opgave 3.4

$$I_{XY\_4} := \frac{U_{XY}}{R_{XY\_4}} = 9.302 \text{ mA}$$

$$U_{12\_4} := I_{XY\_4} \cdot R_{12\_4} = 4.651 \text{ V}$$

$$I_{1\_4} := \frac{U_{12\_4}}{R_{1\_4}} = 4.651 \text{ mA}$$

$$I_{2\_4} := \frac{U_{12\_4}}{R_{2\_4}} = 4.651 \text{ mA}$$

$$U_{34\_4} := I_{XY\_4} \cdot R_{34\_4} = 15.349 \text{ V}$$

$$I_{3\_4} := \frac{U_{34\_4}}{R_{3\_4}} = 4.651 \text{ mA}$$

$$I_{4\_4} := \frac{U_{34\_4}}{R_{4\_4}} = 4.651 \text{ mA}$$

Kontrol af beregninger:

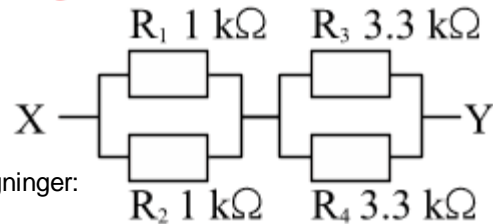
$$I_{XY\_4} = 9.302 \text{ mA}$$

$$I_{1\_4} + I_{2\_4} = 9.302 \text{ mA}$$

$$U_{12\_4} + U_{34\_4} = 20 \text{ V}$$

$$I_{3\_4} + I_{4\_4} = 9.302 \text{ mA}$$

Fig. 2.4



## Opgave 3.5

$$I_{XY\_5} := \frac{U_{XY}}{R_{XY\_5}} = 9.088 \text{ mA}$$

$$I_{3\_5} := \frac{U_{XY}}{R_{3\_5}} = 2 \text{ mA}$$

$$I_{124\_5} := \frac{U_{XY}}{R_{124\_5}} = 7.088 \text{ mA}$$

$$U_{4\_5} := R_{4\_5} \cdot I_{124\_5} = 7.088 \text{ V}$$

$$U_{12\_5} := R_{12\_5} \cdot I_{124\_5} = 12.912 \text{ V}$$

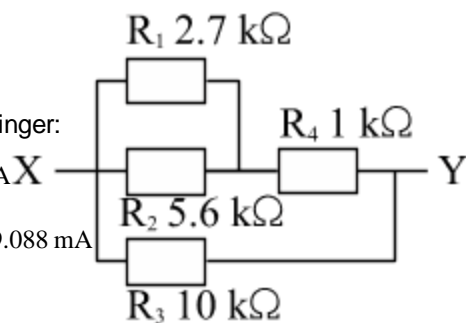
Kontrol af beregninger:

$$I_{XY\_5} = 9.088 \text{ mA}$$

$$I_{3\_5} + I_{124\_5} = 9.088 \text{ mA}$$

$$U_{4\_5} + U_{12\_5} = 20 \text{ V}$$

Fig. 2.5



Fortsættes næste side

Fortsat

$$I_{1\_5} := \frac{U_{12\_5}}{R_{1\_5}} = 4.782 \text{ mA}$$

$$I_{2\_5} := \frac{U_{12\_5}}{R_{2\_5}} = 2.306 \text{ mA}$$

Kontrol af beregninger:

$$I_{124\_5} = 7.088 \text{ mA}$$

$$I_{1\_5} + I_{2\_5} = 7.088 \text{ mA}$$