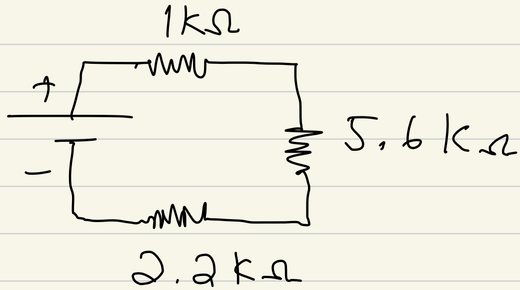
Chapter 5 H/W

Thomas Crow
9/28/21

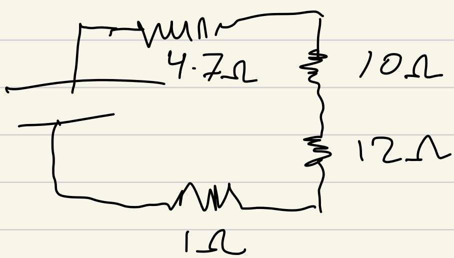
8, 19, 20, 23, 24, 31, 34, 36

8) a)



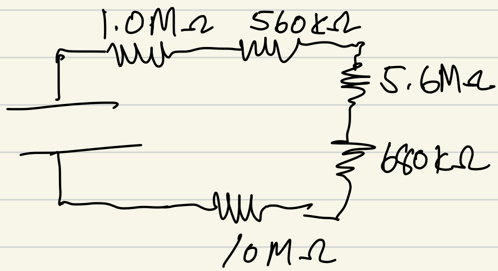
$R_T = R_1 + R_2 + R_3 = 1 + 5.6 + 2.2 = \boxed{8.8 k\Omega}$

b)



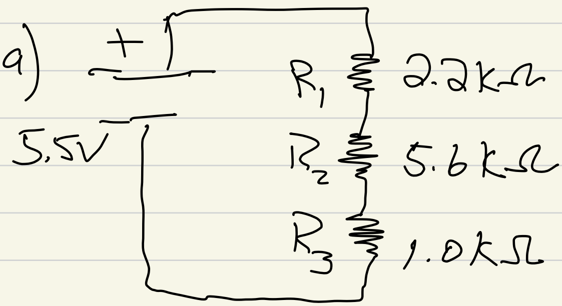
$4.7 + 10 + 12 + 1 = \boxed{27.7\Omega}$

c)



$1 + 0.56 + 5.6 + 0.68 + 10 = \boxed{17.84 M\Omega}$

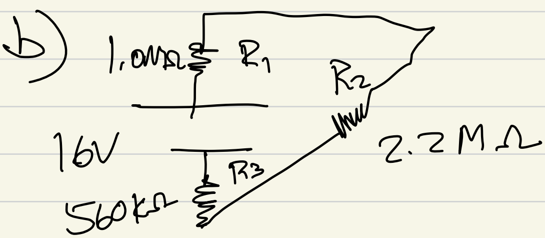
19) a)



$$R_T = 2.2 + 5.6 + 1 = 8.8\,k\Omega$$

$$I = \frac{V}{R} = \frac{5.5V}{8.8\,k\Omega} = \boxed{0.625\,mA \text{ or } 625\,\mu A}$$

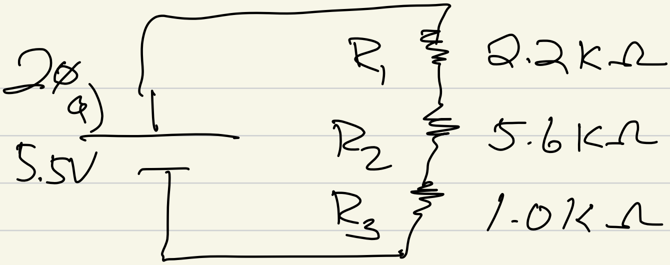
b)



$$R_T = 1 + 2.2 + 0.56 = 3.76\,M\Omega$$

$$I = \frac{V}{R} = \frac{16V}{3.76\,M\Omega} = \boxed{4.26\,\mu A}$$

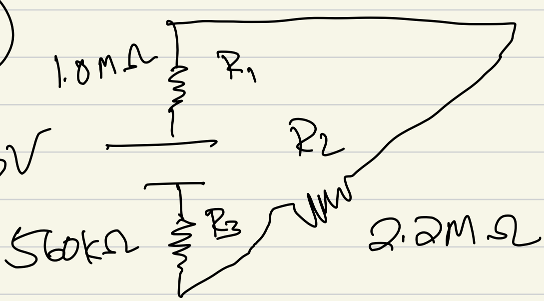
20 a)



$I = 625\,\mu A$

$$V_{R_1} = I \cdot R_1 = (625\,\mu A)(2.2\,k\Omega) = \boxed{1.375\,V}$$
$$V_{R_2} = I \cdot R_2 = (625\,\mu A)(5.6\,k\Omega) = \boxed{3.5\,V}$$
$$V_{R_3} = I \cdot R_3 = (625\,\mu A)(1.0\,k\Omega) = \boxed{0.625\,V}$$

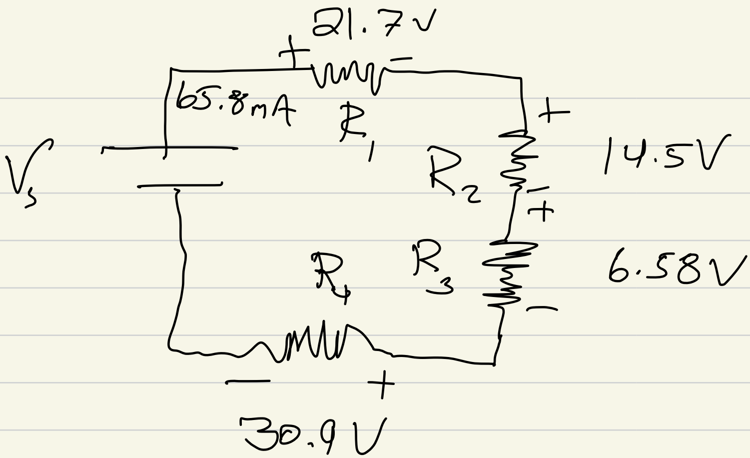
b)



$I = 4.26\,\mu A$

$$V_{R_1} = I \cdot R_1 = (4.26\,\mu A)(1.0\,M\Omega) = \boxed{4.26\,V}$$
$$V_{R_2} = I \cdot R_2 = (4.26\,\mu A)(2.2\,M\Omega) = \boxed{9.372\,V}$$
$$V_{R_3} = I \cdot R_3 = (4.26\,\mu A)(0.560\,M\Omega) = \boxed{2.386\,V}$$

23)



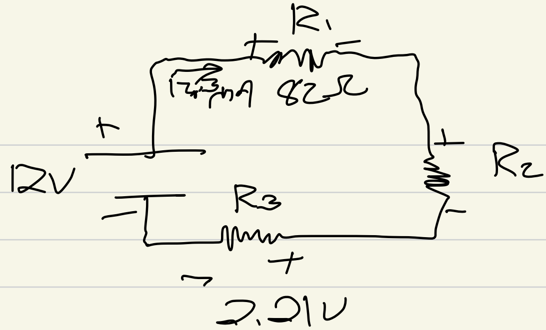
$$R_1 = \frac{V_1}{I} = \frac{21.7V}{65.8mA} = \boxed{329.787\,\Omega}$$

$$R_2 = \frac{V_2}{I} = \frac{14.5V}{65.8\ mA} = \boxed{220.365\,\Omega}$$

$$R_3 = \frac{V_3}{I} = \frac{6.58V}{65.8mA} = \boxed{100\,\Omega}$$

$$R_4 = \frac{V_4}{I} = \frac{30.9V}{65.8mA} = \boxed{469.605\,\Omega}$$

24)



$I = 12.3 \text{ mA}$

Find V_{R_1}, R_2, R_3

$$V_{R_1} = I \cdot R_1 = (12.3\text{mA})(82\,\Omega) = \boxed{1.009\text{ V}}$$

$$R_3 = \frac{V_{R_3}}{I} = \frac{(2.21\text{V})}{(12.3\text{mA})} = \boxed{179.675\,\Omega}$$

$$V_T - V_{R_1} - V_{R_2} - V_{R_3} = 0$$

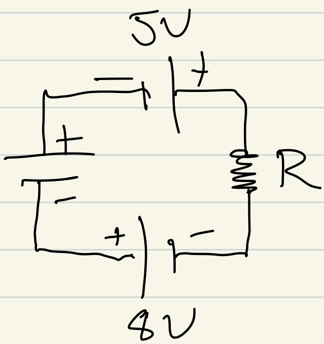
$$V_{R_2} = V_T - V_{R_1} - V_{R_3} \Rightarrow$$

$$V_{R_2} = 12 - 1.009 - 2.21 = 8.781\text{V}$$

$$R_2 = \frac{V_{R_2}}{I} = \frac{8.781}{12.3\text{mA}} \boxed{= 713.902}$$

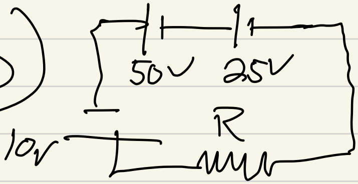
31)

a)



$10V + 8V + 5V = \boxed{23V}$

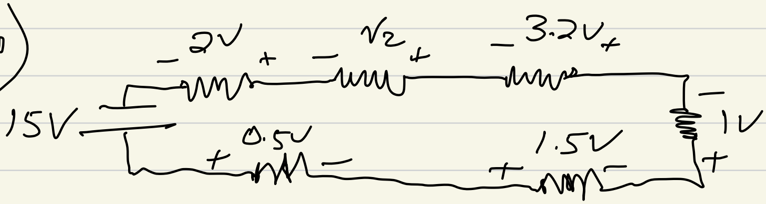
b)



$25V + 50V + 10V = \boxed{85V}$

34)

a)



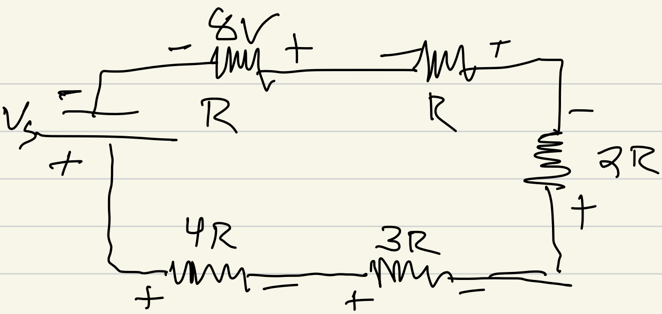
$$V_T - V_1 - V_2 - V_3 - V_4 - V_5 - V_6 = 0$$

$$V_2 = V_T - V_1 - V_3 - V_4 - V_5 - V_6$$

$$V_2 = 15V - 2V - 3.2V - 1V - 1.5V - 0.5V$$

$$\boxed{= 6.8V}$$

b)



$$R_T = R + R + 2R + 3R + 4R = 11R$$

$$V_{R_1} = 8V$$

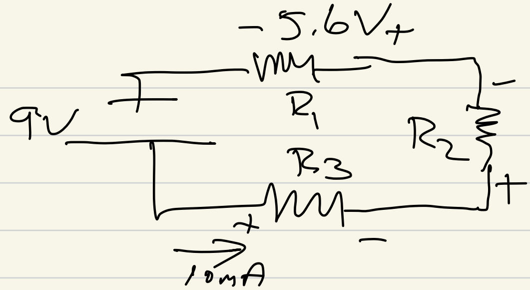
$$V_{R_2} = IR_2 = IR_1 = V_{R_1} = 8V$$

$$V_{R_3} = IR_3 = I\,2(R_2) \Rightarrow 2(IR_2) = 2(8V) = 16V$$

$$V_{R4} = IR_4 = I\,3(R_2) \Rightarrow 3(IR_2) = 3(8V) = \boxed{24V}$$

$$V_{R5} = IR_5 = I\,4(R_2) = 4(IR_2) = 4(8V) = \boxed{32V}$$

36)



$P_2 = 22mW$

$I = 10mA$

$V_T = 9V$

$V_{R_1} = 5.6V$

$$R_1 = \frac{V_{R_1}}{I} = \frac{5.6V}{10mA} = \boxed{560\Omega}$$

$$P_2 = I^2 R_2 \Rightarrow R_2 = \frac{P_2}{I^2} = \frac{22mW}{(10mA)^2} = \boxed{220\Omega}$$

$$V_{R_2} = I \cdot R_2 = (10mA)(220\Omega) = 2.2V$$

$$V_T - V_{R_3} - V_{R_2} - V_{R_1} = 0$$

$$V_{R_3} = V_T - V_{R_2} - V_{R_1} = 9V - 2.2V - 5.6V = 1.2V$$

$$R_3 = \frac{V_{R_3}}{I} = \frac{1.2V}{10mA} = \boxed{120\Omega}$$