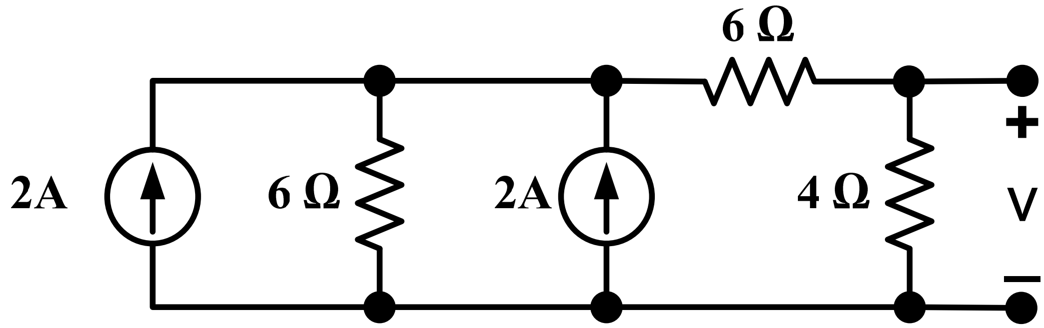
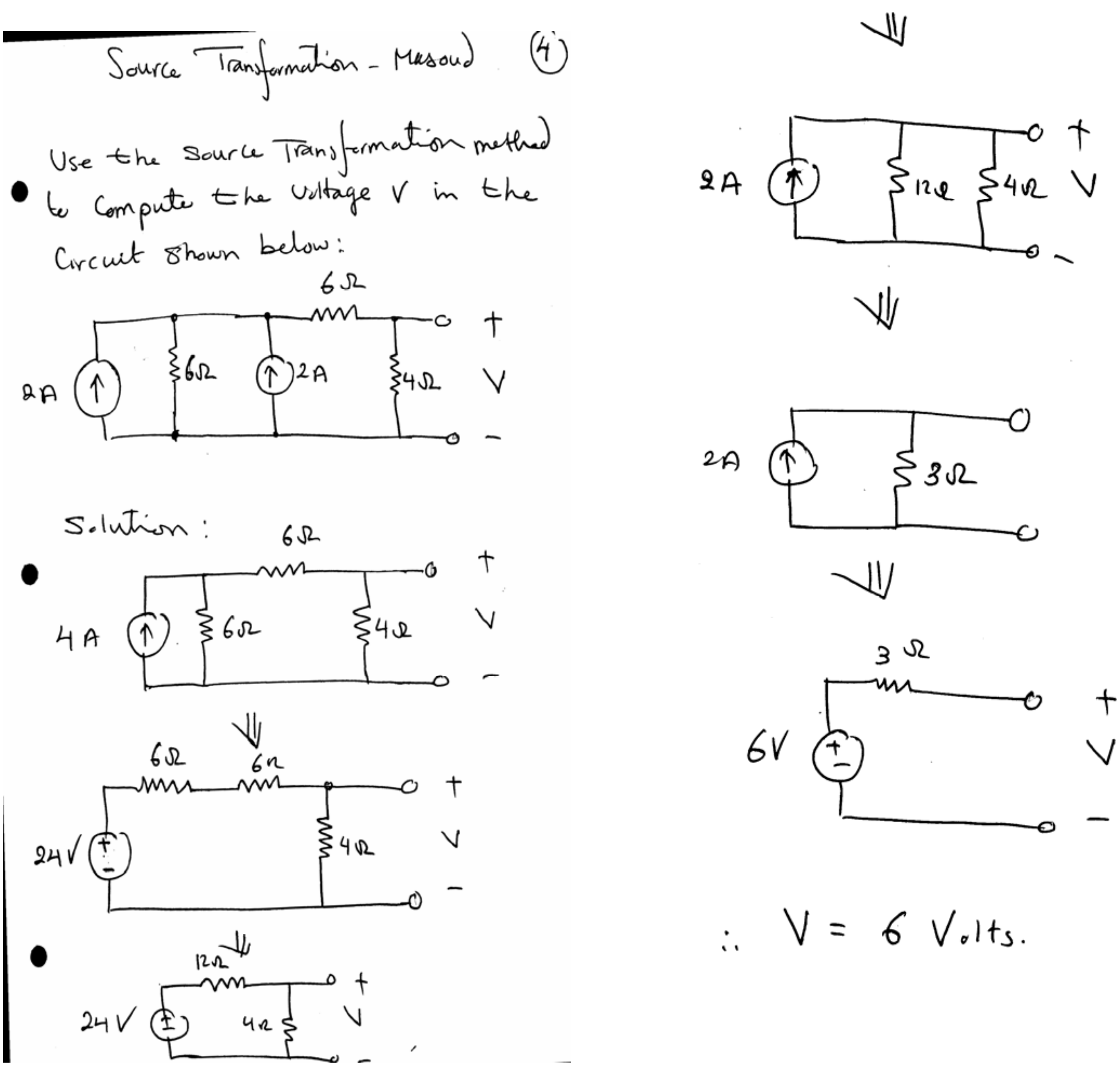
Question 1:

Use only source transformation to compute the voltage V in the circuit shown below.





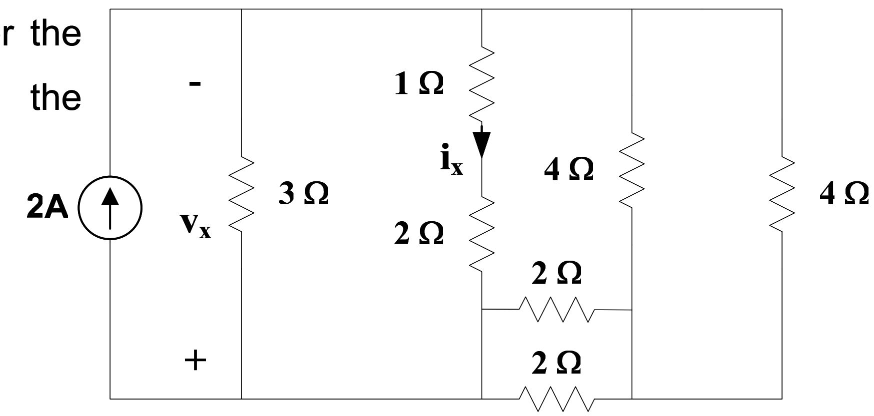
Question 2:

Apply circuit reduction method for the circuit shown below to obtain the following:

a) The voltage $\mathbf{v_x}$.

b) The current $\mathbf{i_x}$.

c) The power **supplied** by the independent current source.



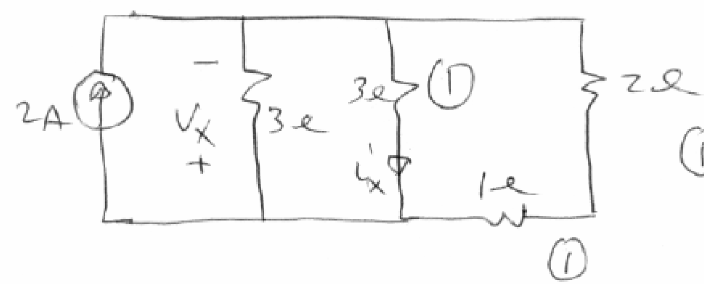
Total 10 points

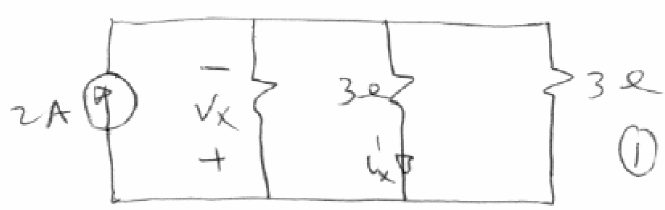
$$V_x = \frac{-2}{\frac{1}{3}+\frac{1}{3}+\frac{1}{3}} = -2V \quad (2)$$

$$i_x = \frac{-V_x}{3} = 2/3\,A \quad (2)$$

$$P_{2A} = -2V_x = 4W \quad (2)$$

Circuit reduction





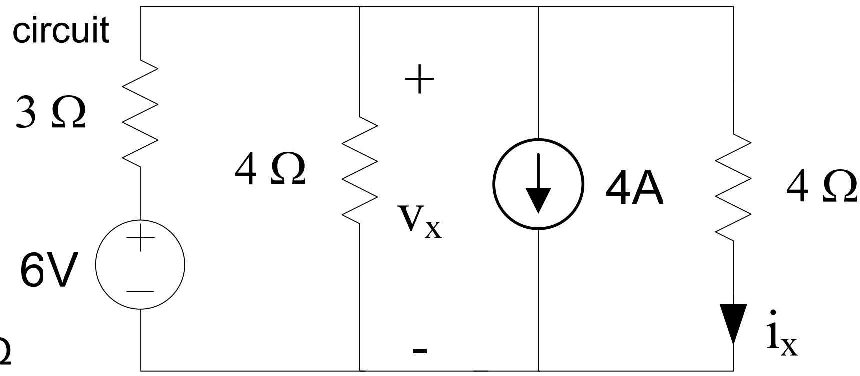
Question 3:

Use the direct method for the circuit shown below to obtain the following:

a) The voltage $\mathbf{v_x}$.

b) The current $\mathbf{i_x}$.

c) The power **absorbed by** the 3 Ω resistor.



Total 10 points

KVL: $V_x = 4i_x'$ (1)

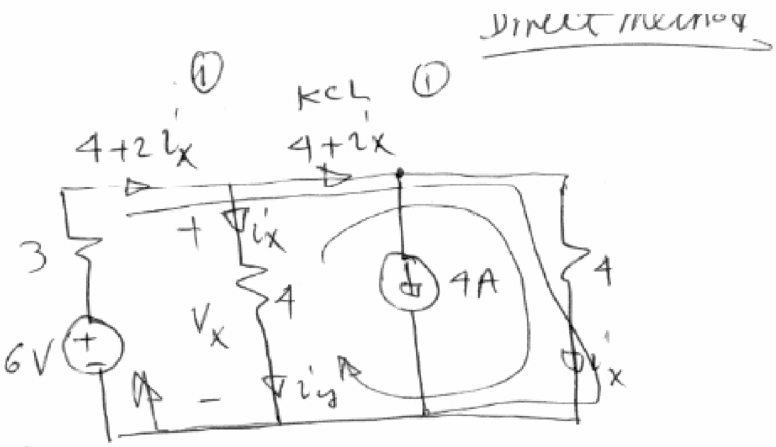
$\Rightarrow i_y' = \frac{V_x}{4} = \frac{4i_x'}{4} = i_x'$ (1)

KVL for the outer loop

$6 = 3(4+2i_x') + 4i_x'$ (2)

$\Rightarrow i_x' = \frac{-6}{10} = -3/5 \text{ A}$ (2)

$V_x = 4i_x' = -12/5 \text{ V}$ (2)



The power absorbed by the 3 Ω resistor:
Find the voltage across the 3 Ω resistor which is:

$$V_{3\Omega} = 6 - v_x = 6 + \frac{12}{5} = \frac{42}{5}$$

$$P_{3\Omega} = \frac{V^2_{3\Omega}}{3} = \frac{588}{25} = 23.52 \text{ watt}$$

Or find the current passing through the 3 Ω resistor which is:

$$I_{3\Omega} = 4 + 2i_x = 4 - \frac{6}{5} = \frac{14}{5}$$

$$P_{3\Omega} = 3I^2_{3\Omega} = 3\times\frac{196}{25} = \frac{588}{25} = 23.52 \text{ watt}$$