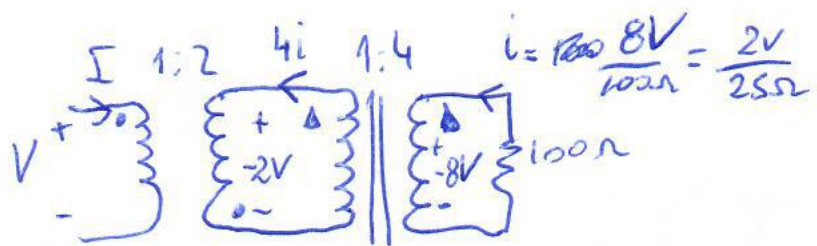


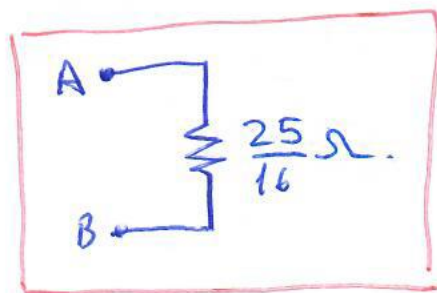
Sample Midterm 1 Solutions

Q1.

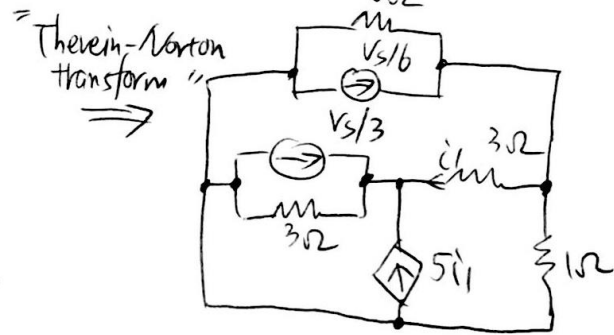
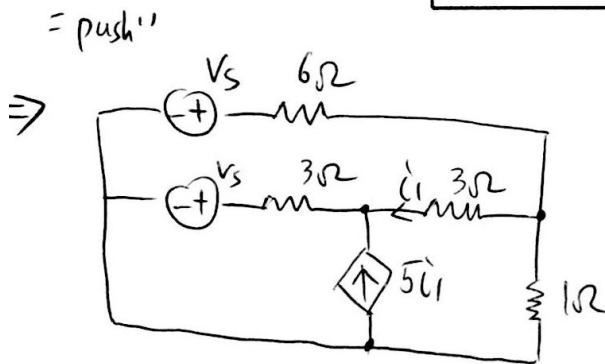
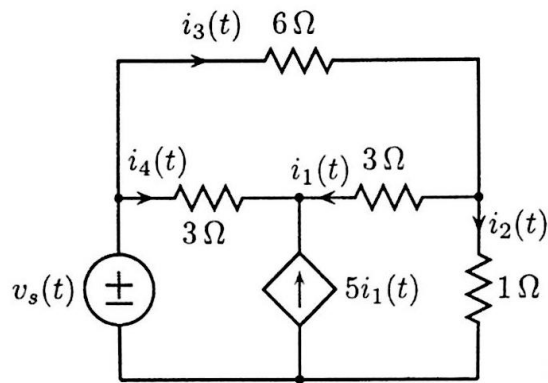


$$i = \frac{8V}{100\Omega} = \frac{2V}{25\Omega}$$

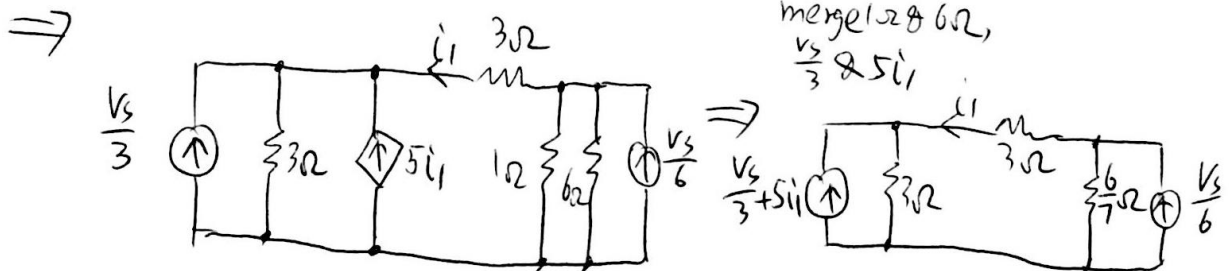
$$I = 8i = 8 \frac{8V}{100\Omega} \rightarrow V = I \frac{100\Omega}{64} \triangleq R_{eq}$$



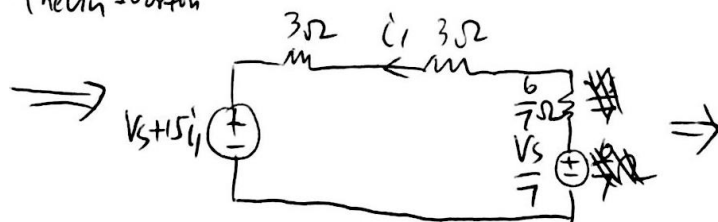
Q2.



redraw



Thevenin-Norton"

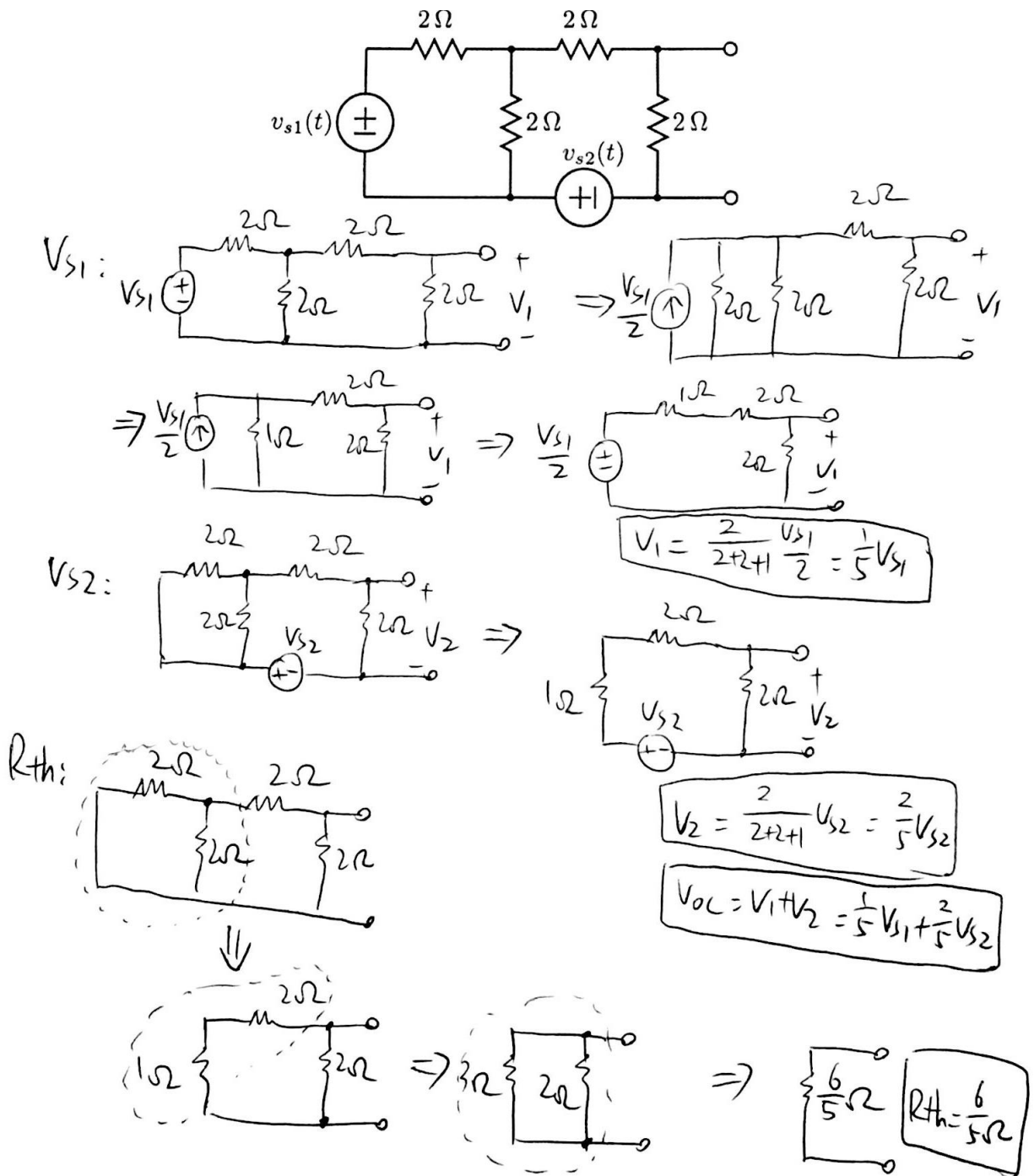


KVL: $\frac{v_s}{7} - \frac{6i_1}{7} - 3i_1 - 3i_1 - v_s - 15i_1 = 0$

$$-\frac{6}{7}v_s = \frac{153}{7}i_1$$

$i_1 = -\frac{2}{51}v_s$

Q3.



Q4.

$$\begin{bmatrix} v1 \\ v2 \\ v3 \\ v4 \end{bmatrix} = \begin{bmatrix} 1 & -3 & -8 & -2 \\ -3 & 4 & -1 & -7 \\ -8 & -1 & 9 & -5 \\ -2 & -7 & -5 & 2 \end{bmatrix} \begin{bmatrix} i1 \\ i2 \\ i3 \\ i4 \end{bmatrix}$$

What do you need to assume to fill in the remaining entries in the matrix? In this case, fill in the remaining entries.

{ Diagonal values are positive
Non-diagonal values are non-positive
matrix is symmetric }

We need to assume that there is no dependent sources in the circuit.