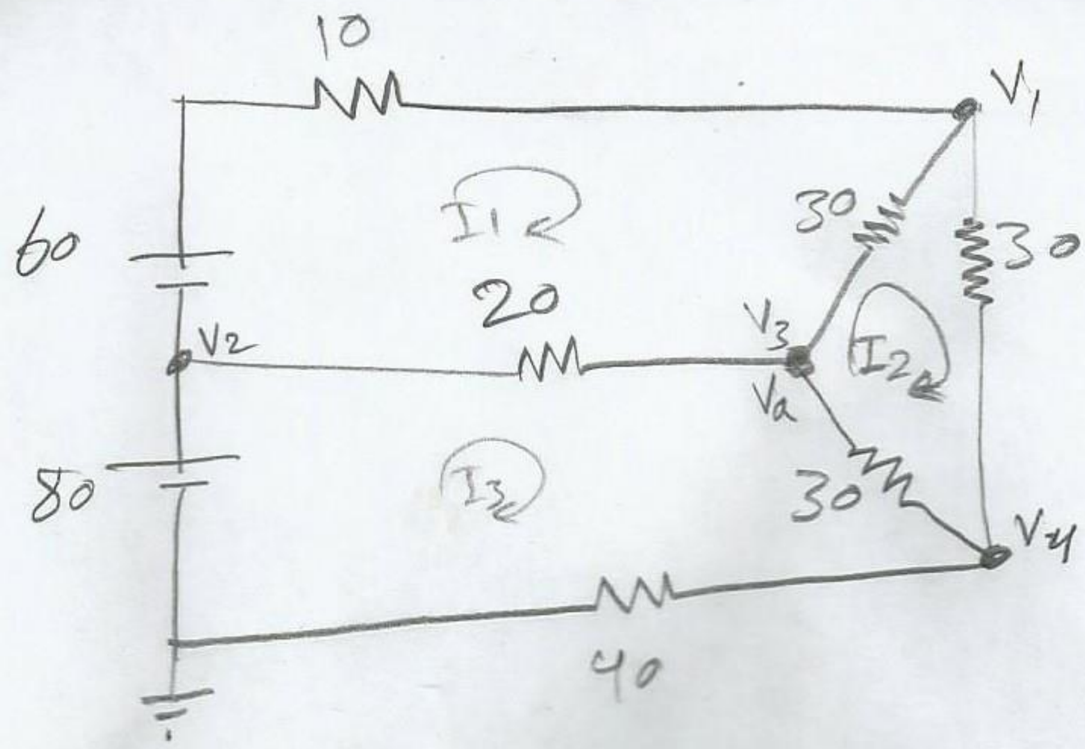

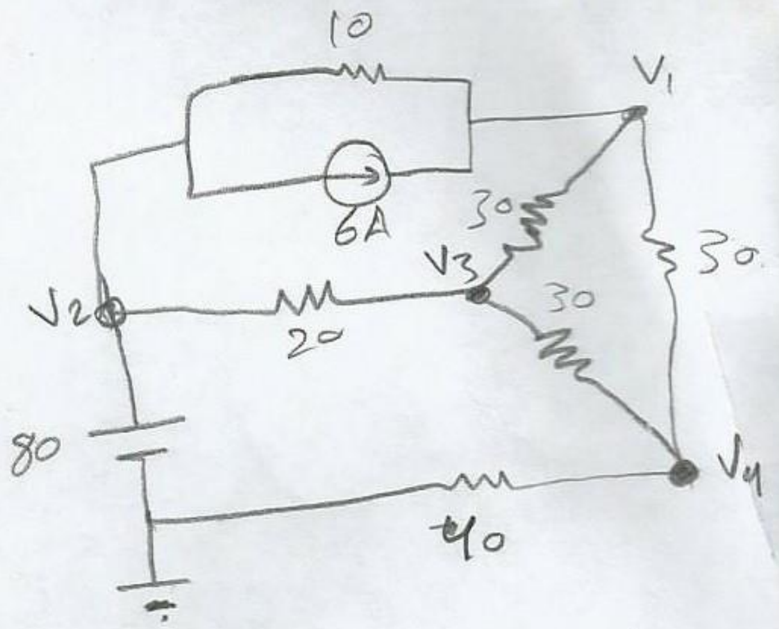

(a)

- write down the mesh eqs ?

- Find V_a

$$I_1(10+20+30) - I_2(30) - I_3(20) = 60$$

$$60I_1 - 30I_2 - 20I_3 = 60 \quad \text{(I)}$$

$$-I_1(30) + I_2(30+30+30) - I_3(30) = 0$$

$$-30I_1 + 90I_2 - 30I_3 = 0 \quad \text{(II)}$$

$$-I_1(20) - I_2(30) + I_3(20+30+40) = 80$$

$$-20I_1 - 30I_2 + 90I_3 = 80 \quad \text{(III)}$$

$I_1 = 2.32\ A$

$I_2 = 1.4\ A$

$I_3 = 1.87\ A$

$$V_a = 80 + (20)[I_1 - I_3] = 80 - [20](I_3 - I_1)$$

$$= 89.03\ V$$

(b)

- write down the Nodal eqs?!

- find V_a

① $V_1\left(\frac{1}{10}+\frac{1}{30}+\frac{1}{30}\right) - \frac{V_2}{10} - \frac{V_3}{30} - \frac{V_4}{30} = 6$

② $V_2 = 80$

③ $-\frac{V_1}{30} - \frac{V_2}{20} + V_3\left(\frac{1}{20}+\frac{1}{30}+\frac{1}{30}\right) - \frac{V_4}{30} = 0$

④ $-\frac{V_1}{30} - \frac{V_3}{30} + V_4\left(\frac{1}{30}+\frac{1}{40}+\frac{1}{30}\right) = 0$

by calc

$V_1 = 116.78\ V$ ✓

$V_3 = 89.03$ ✓

$V_4 = 74.89\ V$ ✓