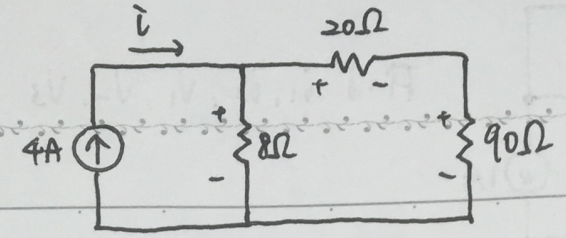
Page
Date

① 

Find all
- voltage
- current
- power

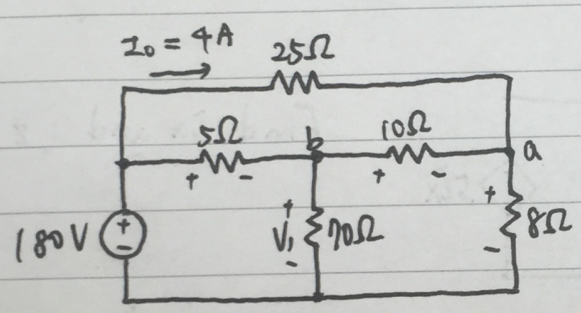
$-4 + i_{20} + i_8 = 0$ — ①

$V_{20} + V_{90} - V_8 = 0 \Rightarrow i_{20} \cdot 20 + i_{90} \cdot 90 - i_8 \cdot 8 = 0$ — ②

$i_{20} = i_{90}$ — ③

①, ②, ③ $\Rightarrow i_{20} = i_{90} = \frac{1}{59}$, $i_8 = \frac{220}{59}$

$V = iR$, $P = Vi$

② 

Find V_1

$V_{25} = 4 \cdot 25 = 100\,V$

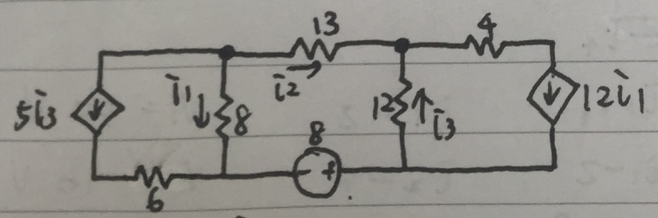
KVL: $100 + V_8 - 180 = 0 \Rightarrow V_8 = 80\,V$

$i_8 = 80/8 = 10\,A$

KCL at a: $i_{10} + 4 - 10 = 0 \Rightarrow i_{10} = 6\,A$

$V_{10} = 6 \cdot 10 = 60\,V$

KVL: $60 + 80 - V_1 = 0 \Rightarrow V_1 = 140\,V$

④ 

$i_1 + i_2 + 5i_3 = 0$

$12i_1 - i_2 - i_3 = 0$

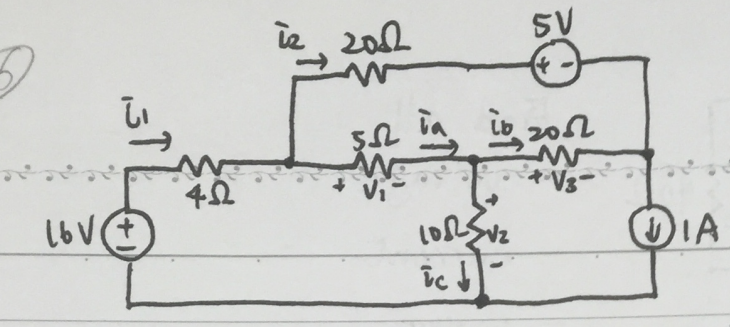
$-8i_1 + 13i_2 - 12i_3 + 8 = 0$

$i_1 = -0.03\,A$

$i_2 = -0.53\,A$

$i_3 = 0.11\,A$

⑥



Find i_1, i_2, V_1, V_2, V_3

$-i_2 - i_b + 1 = 0$

$i_1 - i_c - 1 = 0$

$i_2 + i_a - i_1 = 0$

$i_b + i_c - i_a = 0$

$4i_1 + 5i_a + 10i_c - 16 = 0$

$20i_2 + 5 - 20i_b - 5i_a = 0$

→ Substitute i_a with $i_b + i_c$

$i_b = 1 - i_2$

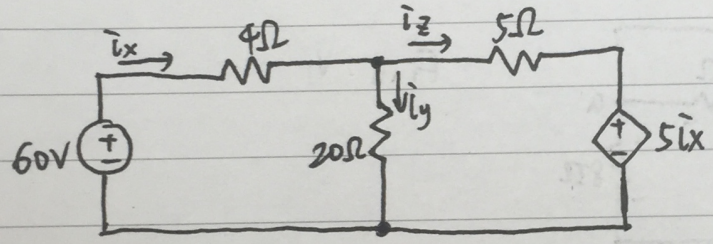
$i_c = i_1 - 1$

→ $19i_1 - 5i_2 = 26$

$9i_2 - i_1 = 3$

$i_1 = 1.5$, $i_2 = 0.5$, $V_1 = 5$, $V_2 = 5$, $V_3 = 10$

⑤



Find i_x and i_z

$i_y + i_z - i_x = 0$

$4i_x + 20i_y - 60 = 0$

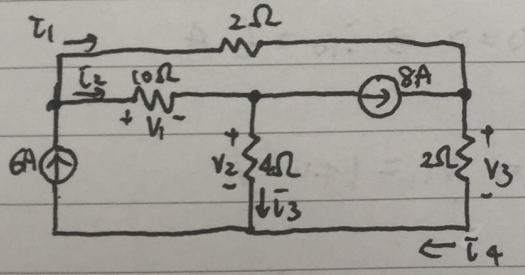
$5i_z + 5i_x - 20i_y = 0$

$i_x = 5$

$i_y = 2$

$i_z = 3$

③



Find V_1, V_2, V_3

$i_1 + i_2 - 6 = 0 \Rightarrow i_2 = 6 - i_1$

$i_3 + 8 - i_2 = 0 \Rightarrow i_3 = -i_1 - 2$

$i_4 - i_1 - 8 = 0 \Rightarrow i_4 = i_1 + 8$

$2i_1 + 2i_4 - 4i_3 - 10i_2 = 0$

$\Rightarrow 18i_1 - 36 = 0$

$i_1 = 2$

$i_2 = 4$

$i_3 = -4$

$i_4 = 10$

$V_1 = 40$ V

$V_2 = -16$ V

$V_3 = 20$ V