

TI DSP, MCU 및 Xilinx Zynq FPGA 프로그래밍 전문가 과정

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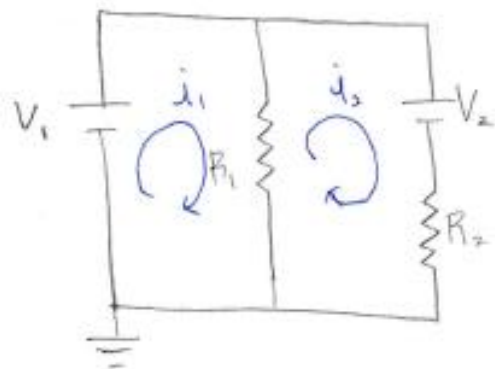
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1~2) 망전류, 마디 전압법

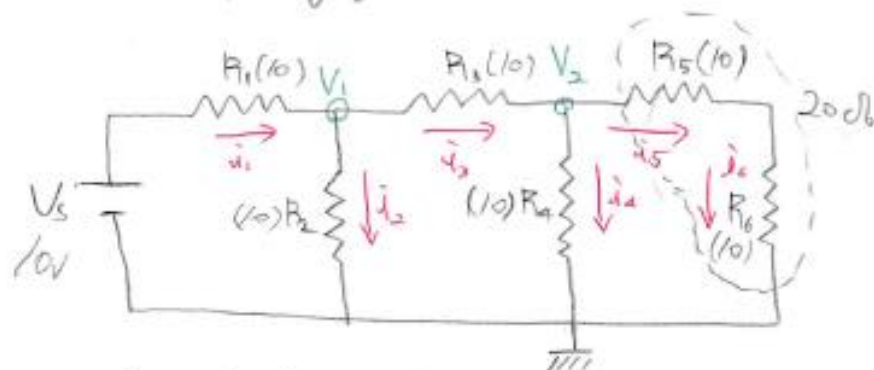
○ 망전류



$$① V_1 = (i_1 - i_2)R_1$$

$$② -V_2 - i_2 R_2 = i_2 R_1$$

○ 마디 전압법



$$① i_1 = i_2 + i_3, \quad i_3 = i_4 + i_5$$

$$② \frac{V_5 - V_1}{R_1} = \frac{V_1}{R_2} + \frac{V_1 - V_2}{R_3}, \quad \frac{V_1 - V_2}{R_3} = \frac{V_2}{R_4} + \frac{V_2}{20}$$

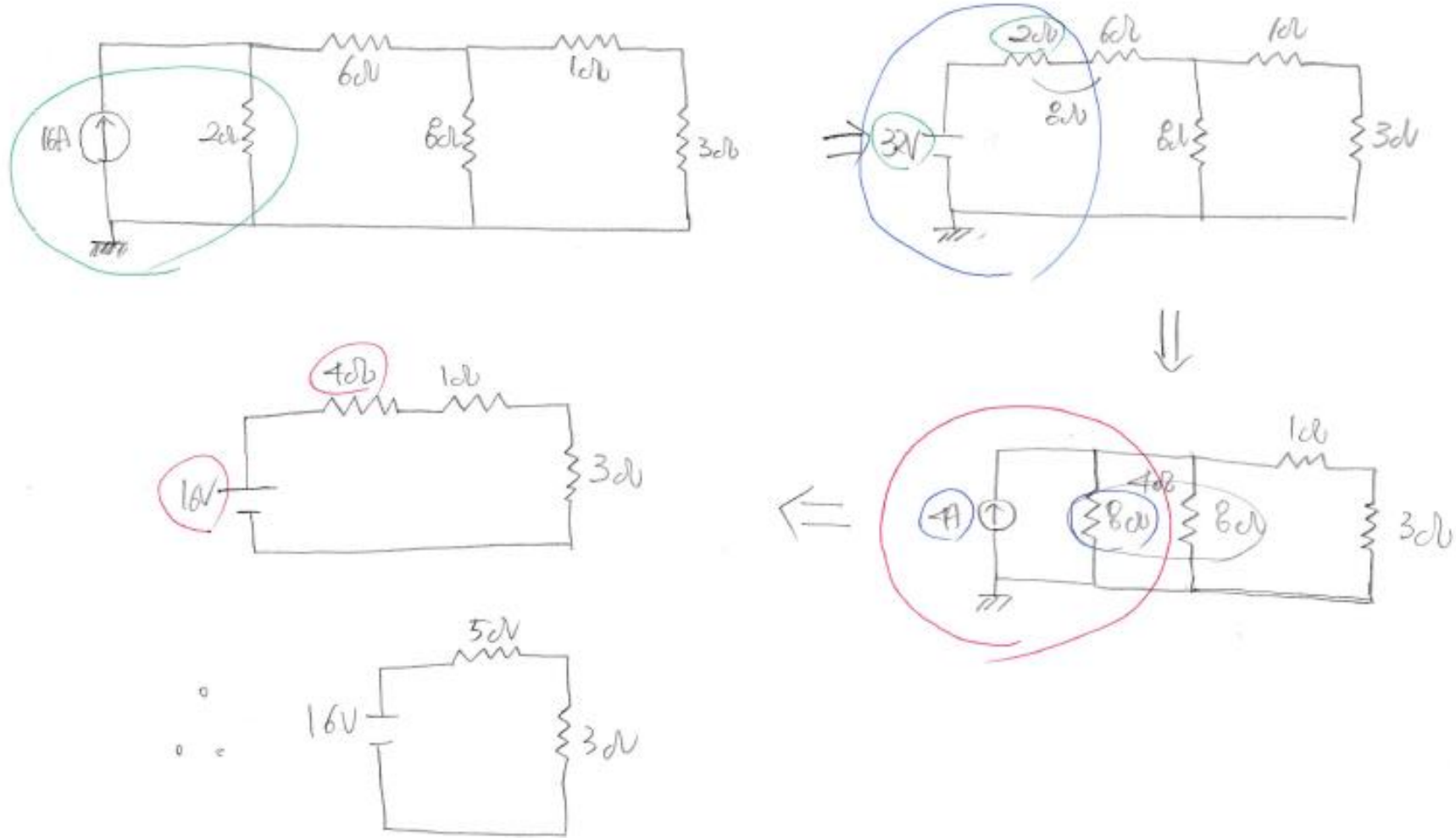
$$③ V_5 = 3V_1 - V_2, \quad 2V_1 - 2V_2 = 2V_2 + V_2 \Rightarrow V_1 = \frac{5}{2}V_2$$

$$④ 10 = \frac{15V_2 - V_2}{2} \\ = \frac{13}{2}V_2$$

$$\therefore V_2 = \frac{20}{13}V, \quad V_1 = \frac{50}{13}V$$

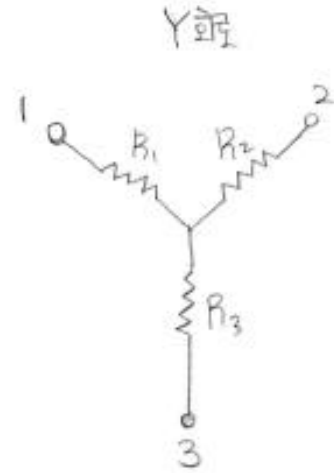
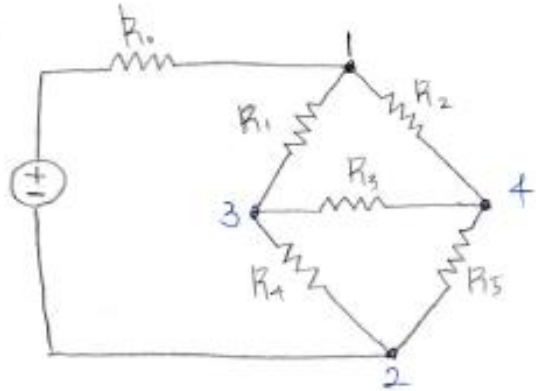
3) 전류원 <-> 전압원

o 전류원 <-> 전압



4) Y to Delta Transformation

○ Y- Δ Transform

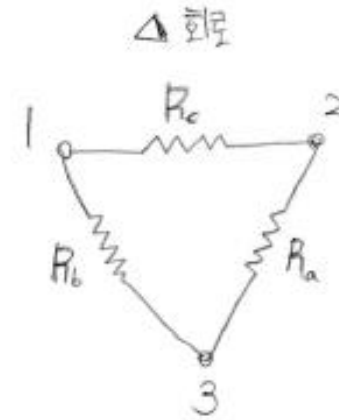


Y to Δ

$$R_a = \frac{R_1 R_2 + R_2 R_3 + R_3 R_1}{R_1}$$

$$R_b = \frac{R_1 R_2 + R_2 R_3 + R_3 R_1}{R_2}$$

$$R_c = \frac{R_1 R_2 + R_2 R_3 + R_3 R_1}{R_3}$$



Δ to Y

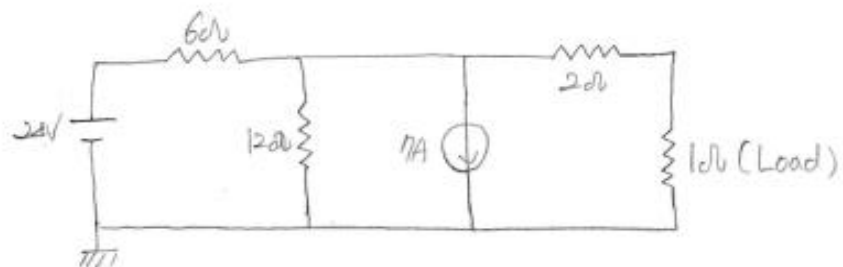
$$R_1 = \frac{R_b R_c}{R_a + R_b + R_c}$$

$$R_2 = \frac{R_a R_c}{R_a + R_b + R_c}$$

$$R_3 = \frac{R_a R_b}{R_a + R_b + R_c}$$

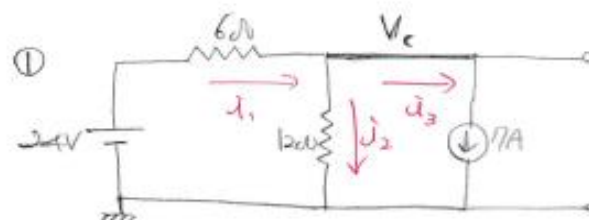
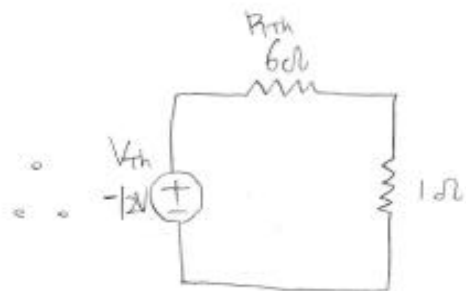
5) Thevenin 등가회로 1

○ Thevenin 등가회로 1



① 테브넨 전압은 부하회로를 개방하여 얻는다.

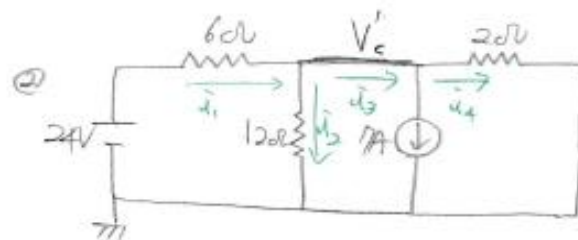
② 테브넨 저항은 부하를 지면 short 하여 구함.



$$1) i_1 = i_2 + i_3$$

$$\Rightarrow \frac{24 - V_c}{6} = \frac{V_c}{12} + 7$$

$$3) 3V_c = -36 \quad \therefore V_c = -12 = V_{Th}$$



$$1) i_1 = i_2 + i_3 + i_4$$

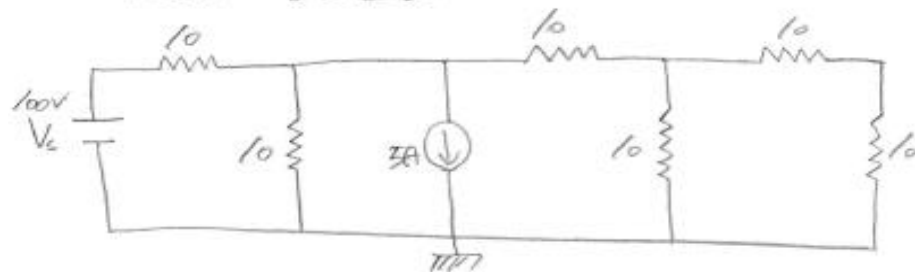
$$2) \frac{24 - V'_c}{6} = \frac{V'_c}{12} + 7 + \frac{V'_c}{2} = 48 - 2V'_c = V'_c + 84 + 6V'_c$$

$$3) 9V'_c = -36 \quad \therefore V'_c = -4, \quad i_4 = -2A$$

$$\therefore R_{Th} = \frac{-12}{-2} = 6\Omega$$

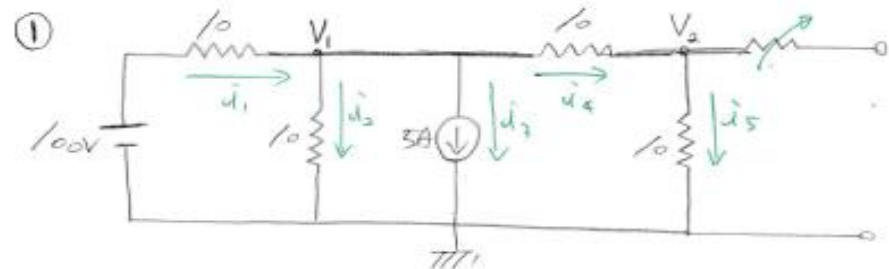
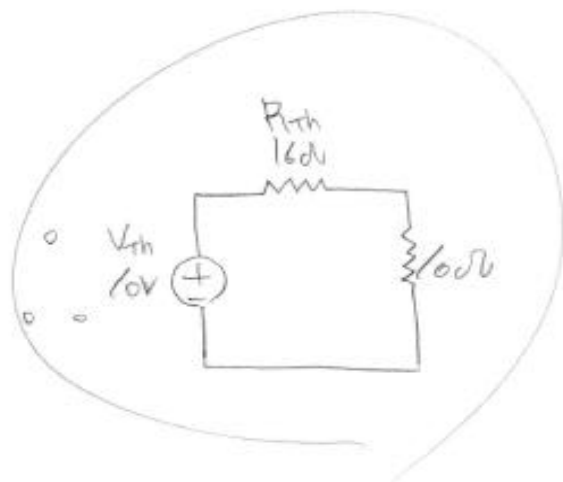
5) Thevenin 등가회로 2

○ Thevenin 등가회로 2



① 테브넨 전압은 부하회로를 개방하여 얻는다.

② 테브넨 저항은 부하를 지우고 short하여 구함.

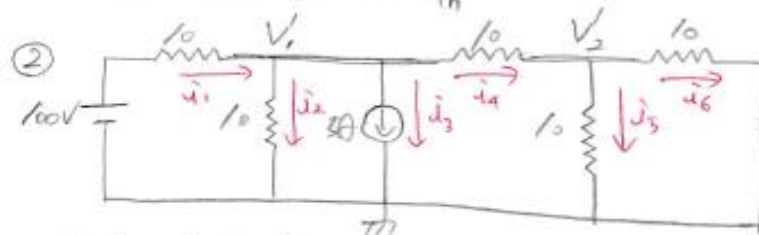


$$1) \quad i_1 = i_2 + i_3 + i_4, \quad i_4 = i_5$$

$$2) \quad \frac{100 - V_1}{10} = \frac{V_1}{10} + 5 + \frac{V_1 - V_2}{10}, \quad \frac{V_1 - V_2}{10} = \frac{V_2}{10} \Rightarrow V_1 = 2V_2$$

$$\Rightarrow 50 = 3V_1 - V_2$$

$$\therefore V_2 = 10V = V_{Th}$$



$$1) \quad i_1 = i_2 + i_3 + i_4, \quad i_4 = i_5 + i_6$$

$$2) \quad \frac{100 - V_1'}{10} = \frac{V_1'}{10} + 5 + \frac{V_1' - V_2'}{10}, \quad \frac{V_1' - V_2'}{10} = \frac{V_2'}{10} + \frac{V_2'}{10} \Rightarrow V_1' = 3V_2'$$

$$\Rightarrow 50 = 2V_1' - V_2'$$

$$V_2 = \frac{50}{8}V \quad \therefore R_{Th} = \frac{8}{5} \times 10 = 16\Omega$$