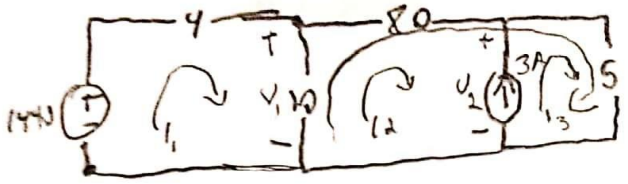
HW#8 ①



find V_1 & V_2

$I_2 - I_3 = 3A$ ③

mesh I_1: $-144 + 4I_1 + 10(I_1 - I_2) = 0$

$14I_1 - 10I_2 = 144$ ②

super mesh: $10(I_2 - I_1) + 80I_2 + 5I_3 = 0$

$-10I_1 + 90I_2 + 5I_3 = 0$ ③

$$\begin{bmatrix} 14 & -10 & 0 & 144 \\ 0 & 1 & -1 & 3 \\ -10 & 90 & 5 & 0 \end{bmatrix}$$

$I_1 = 11$

$I_2 = 1$

$I_3 = -4$

$V_1 = 10(I_1 - I_2) = 10(11 - 1)$ $= 100V$

$V_2 = 5I_3 = 5(4)$ $= 20V$

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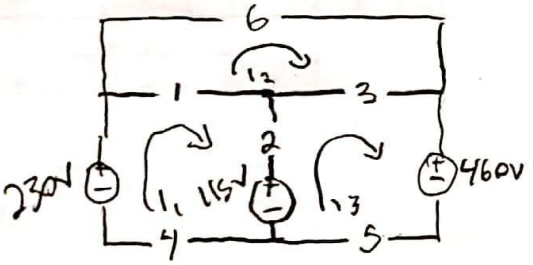
②



mesh I_1: $-230 + 1(I_1 - I_2) + 2(I_1 - I_3) + 115V + 4I_1 = 0$

$7I_1 - I_2 - 2I_3 = 115$ ①

mesh I_2: $6I_2 + 3(I_2 - I_3) + 1(I_2 - I_1) = 0$

$-I_1 + 10I_2 - 3I_3 = 0$ ②

mesh I_3: $-115 + 2(I_3 - I_1) + 3(I_3 - I_2) + 460 + 5I_3 = 0$

$-2I_1 - 3I_2 + 10I_3 = -345$

$$\begin{bmatrix} 7 & -1 & -2 & 115 \\ -1 & 10 & -3 & 0 \\ -2 & -3 & 10 & -345 \end{bmatrix}$$

$I_1 = 4.4$

$I_2 = -10.6$

$I_3 = -36.8$

$P_{230} = -230(4.4) = -1012w$

$P_{115} = 115(4.4 - (-36.8)) = 4738w$

$P_{460} = 460(-36.8) = -16928w$

$P_6 + P_1 + P_3 + P_2 + P_4 + P_5 + P_{115}$

$= (-10.6)^2(6) + (-10.6 - 4.4)^2 1 + (-36.8 - (-10.6))^2 3 + (4.4 + 36.8)^2 2 + 4.4^2(4) + (36.8)^2 5 + 4738$

$= 674.16 + 225 + 2059.32 + 3394.88 + 77.44 + 6771.2 + 4738$

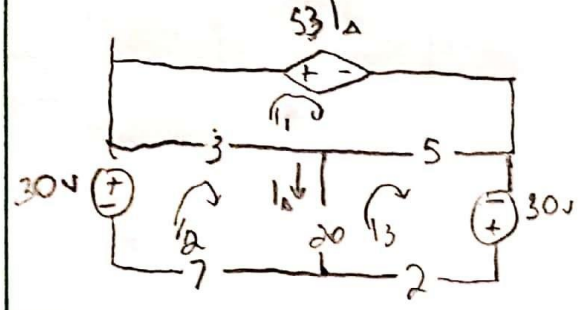
$= 17940$

-17940

$17940 - 17940 = 0$ ✓

Chad Rathbun

Hw#8 (3)



$I_\Delta = I_2 - I_3$

$I_\Delta = 52 - 60 = -8A$

$V = 53(-8) = -424V$

mesh I_2: $-30 + 3(I_2 - I_1) + 20(I_2 - I_3) + 7(I_2) = 0$

$-3I_1 + 30I_2 - 20I_3 = 30$ (1)

mesh I_1: $53(I_1 - I_3) + 5(I_1 - I_2) + 3(I_1 - I_2) = 0$

$8I_1 + 50I_2 - 58I_3 = 0$ (2)

mesh I_3: $20(I_3 - I_2) + 5(I_3 - I_1) - 30 + 2(I_3) = 0$

$-5I_1 - 20I_2 + 27I_3 = 30$ (3)

$$\begin{bmatrix} -3 & 30 & -20 & 30 \\ 8 & 50 & -58 & 0 \\ -5 & -20 & 27 & 30 \end{bmatrix}$$

$I_1 = 110A$

$I_2 = 52\ A$

$I_3 = 60\ A$

$P_{53I_\Delta} = -424(110) = -46640w$

$P_{30} = 30(52) = 1560w$

$P_{30} = 30(60) = 1800w$

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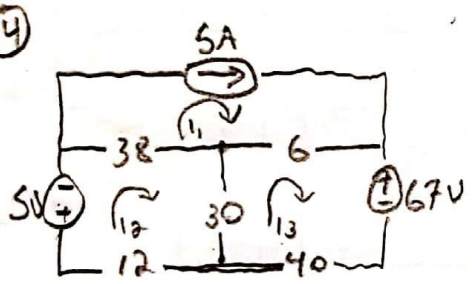
(4)



$I_1 = 5$

mesh I_2: $5 + 38(I_2 - 5) + 30(I_2 - I_3) + 12I_2 = 0$

$80I_2 - 30I_3 = 185$

$I_2 = \frac{185 + 30I_3}{80}$

mesh I_3: $30(I_3 - I_2) + 6(I_3 - 5) + 67 + 40I_3 = 0$

$73I_3 - 30I_2 = -37$

$73I_3 - 30\left(\frac{185 + 30I_3}{80}\right) = -37$

$5180I_3 = 2590$

$I_3 = .5A$

$I_2 = 2.5A$

$-V_{5A} + 6(I_1 - I_3) + 38(I_1 - I_2) = 0$

$V_{5A} = 6(5 - .5) + 38(5 - 2.5)$

$= 122V$

$P_{5A} = (122)(5) = 610w$

$P_{5V} = -(2.5)(5) = -12.5w$

$P_{67} = -.5(67) = -33.5w$

$P_{38} = 38(2.5 - 5)^2 = 237.5$

$P_{12} = 12(2.5)^2 = 75w$

$P_6 = 6(.5 - 5)^2 = 121.5w$

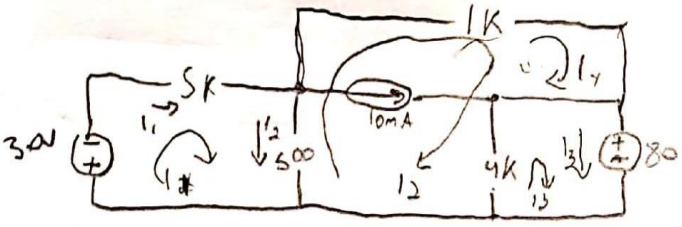
$P_{40} = 40(.5)^2 = 10w$

$P_{30} = 30(2.5 - .5)^2 = 120w$

add up = 610

$610w = 610w$ ✓

Hw #8 (5)



$I_2 - I_4 = 10mA$

mesh I_1: $30 + 5000I_1 + 500(I_1 - I_2) = 0$

$5500I_1 - 500I_2 = -30$

super mesh: $500(I_2 - I_1) + 1000(I_2) + 4000(I_2 - I_3) + 1000(I_4) = 0$

$-500I_1 + 5500I_2 - 4000I_3 = 0$

mesh I_3: $4000(I_3 - I_2) + 80 = 0$

$-4000I_2 + 4000I_3 = -80$

$$\begin{bmatrix} 5500 & -500 & 0 & 0 & -30 \\ -500 & 5500 & -4000 & 1000 & 0 \\ 0 & -4000 & 4000 & 0 & -80 \\ 0 & 1 & 0 & -1 & .01 \end{bmatrix}$$

$I_1 = -.00814$
$I_2 = -.02967$
$I_3 = -.0496$
$I_4 = -.0396$

$I_1 = \boxed{-.00814A}$

$I_2 = -.00814 + .02967 = \boxed{.02153A}$

$I_3 = \boxed{-.0496A}$