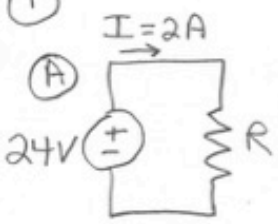
Homework 1 - Answers

(1)



(B) $R = \frac{24V}{2A} = 12\Omega$ (C) $I^2R = 48\,W$

(D) YES (E) NO (F) $-48W$ (G) $60 \times 48 = 2880J$

(2) (A) circuit redrawn

(B) $V_1 =$ (0 V), ground

(C) 200Ω in parallel with 300Ω =

$$\frac{200 \times 300}{200 + 300} = 120\Omega$$

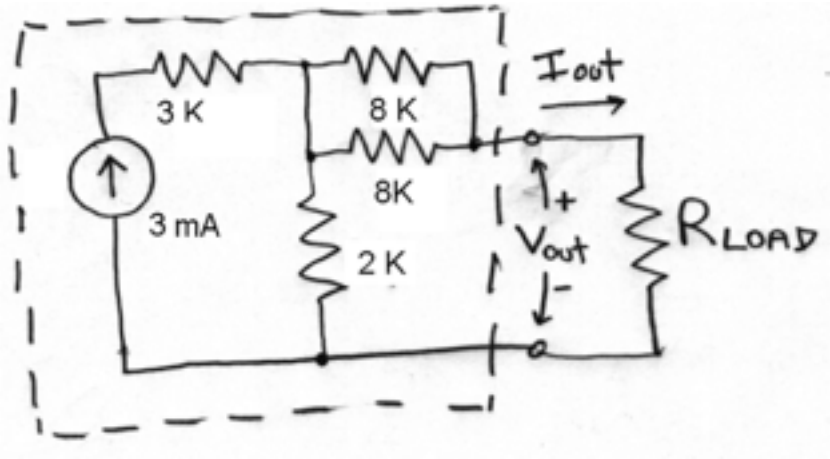
$$V_2 = \frac{120}{120+80} 10V = 6V$$

(D) $V_3 = 10V$

(E) $I = \frac{10V}{120\Omega + 80\Omega} = 50\,mA$

3.

A.



B. Since R_1 is the only component in series with a current source, all of that current must pass through it by Kirchhoff's Current Law, that is, 3 mA.

C. R_{LOAD} should be set to 0 Ω.

D. R_2 in parallel with R_3 is 4 KΩ, which with R_4 form a current divider in which 1/3 of the current will constitute I_{OUT}. Therefore, I_{NORTON} = 1 mA.

E. R_{LOAD} should be set to ∞ Ω.

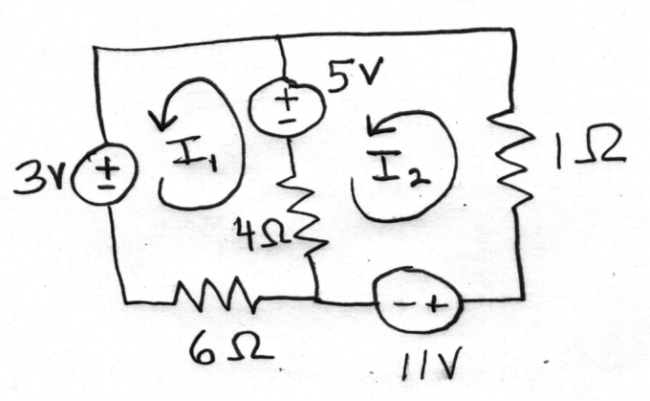
F. Since R_{LOAD} = ∞ Ω , no current will pass through R_2 or R_3, meaning there will be no voltage drop across them. All of I will pass through R_4 , so $V_{OUT} = V_{THEVENIN}$ = 3 mA × 2 KΩ = 6 V.

G. $R_{THEVENIN} = R_{NORTON} = V_{THEVENIN} / I_{NORTON}$ = 6 V / 1 mA = 6 KΩ.

H. Since I = 0, no current will pass through R_1. Thus $R_{THEVENIN} = R_{NORTON}$ is R_2 in parallel with R_3 (4 KΩ) in series with R_4 (2 KΩ), or 6 KΩ.

4.

A.



B.

$$10I_1 - 4I_2 = 2$$
$$-4I_1 + 5I_2 = 6$$

C. I_1 = 1 A and I_2 = 2 A.

D. $10(1) - 4(2) = 2$
$-4(1) + 5(2) = 6$