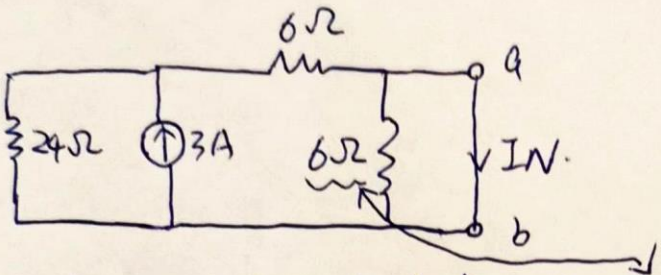
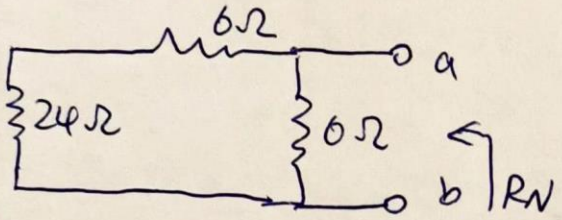
1.



a) When ab is shorted, the 6Ω is also shorted

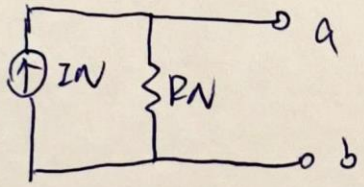
So, $I_N = 3A \times \frac{24}{6+24} = 2.4A$

By opening the current source

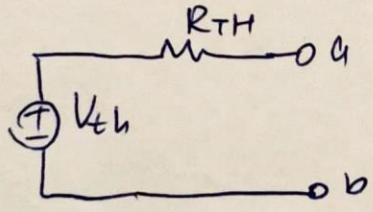


$R_N = 6 \,||\, (6+24) = 5\Omega$

So



$I_N = 2.4A \quad R_N = 5\Omega$



$V_{TH} = I_N \times R_N = 5 \times 2.4 = 12V$

$R_{TH} = 5\Omega$.

b) $R_L = R_{Th} = 5\Omega$

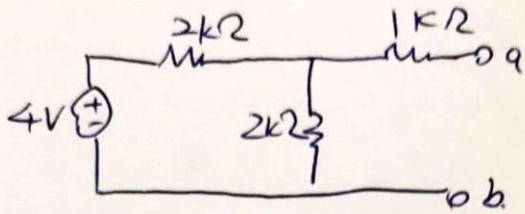
c) $P_{max} = \frac{V_{th}^2}{4R_{th}} = 7.2W$

2. a) making all independent source to zero

$R_{TH} = 1k\Omega + 2k\Omega \,||\, 2k\Omega = 2k\Omega$

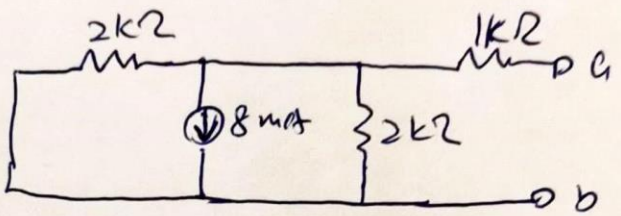
b) $V_{TH} = V_{ab}$, using superposition.

i)



$V_{ab-1} = 4V \times \frac{2}{2+2} = 2V$

ii)

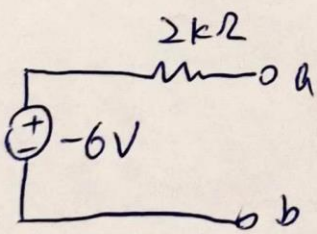


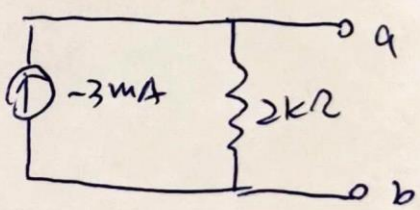
$V_{ab-2} = -8 \times (2\|2) = -8V$

SO ~~Vab~~ $V_{TH} = V_{ab} = 2V - 8V = -6V$.

c) $I_N = \frac{V_{TH}}{R_{TH}} = -3mA$

d)





e) $I_{load} = \frac{2}{2+4} \times (-3mA) = -1mA$

f) $R_L = R_{TH} = 2k\Omega$

g) $P_{max} = V_{th}^2 / 4R_{th} = 9/2\ mW$