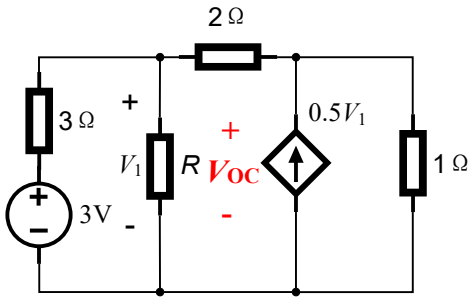
1. (4 points) In the circuit below, how much resistance of R will draw the maximum power from the circuit? Calculate the maximum power.



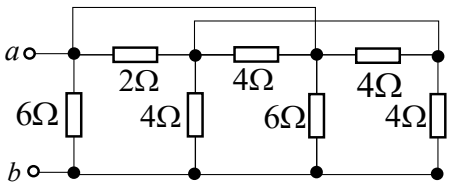
Open the R, transform the $0.5V_1$(A) in parallel with 1Ω into a $0.5V_1$(V) in series with 1Ω, then transform into a $0.5V_1/3$(A) in parallel with 3Ω

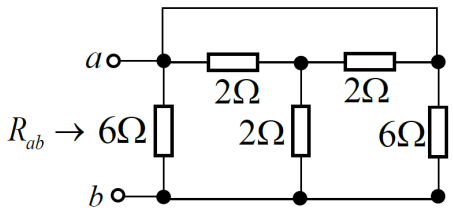
$$\left(\frac{1}{3}+\frac{1}{3}\right)V_{OC}=\frac{3}{3}+\frac{0.5V_{OC}}{3}\Rightarrow V_{OC}=2\text{V}$$

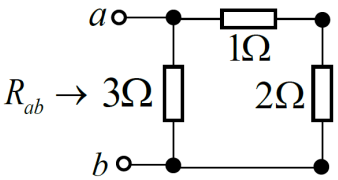
$$I_{SC}=\frac{3}{3}=1\text{A}\Rightarrow R_0=\frac{V_{OC}}{I_{SC}}=2\Omega$$

$$\text{When } R=R_0=2\Omega,\ P_{\max}=\frac{V_{OC}^2}{4R_0}=0.5\text{W}$$

2. (3 points) Find the equivalent resistance R_{ab} as seen from terminals a-b.

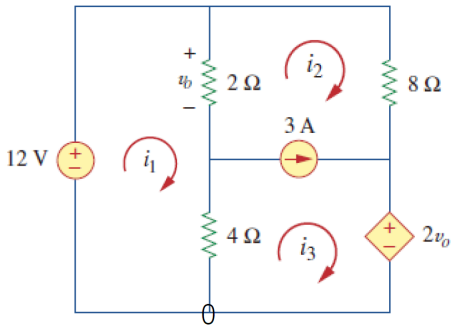






$$R_{ab}=\frac{(1+2)\times 3}{(1+2)+3}=\frac{3}{2}\Omega$$

3. (3 points) Calculate the power developed by the dependent source, and determine whether the power is supplied or absorbed.



$$\begin{cases}12=2(i_1-i_2)+4(i_1-i_3)\\2(i_2-i_1)+8i_2+2v_0+4(i_3-i_1)=0\\v_0=2(i_1-i_2)\\3=i_3-i_2\end{cases}\Rightarrow\begin{cases}i_3=2.5\text{A}\\v_0=8\text{V}\end{cases}$$

$$P=2v_0\times i_3=40\text{W absorbed power}$$