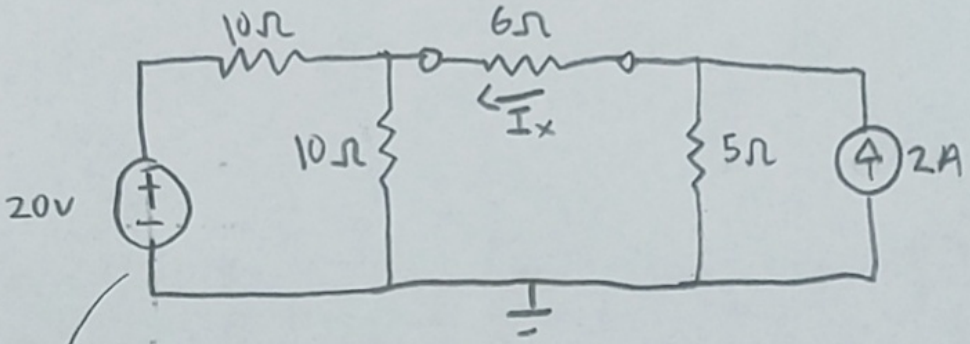
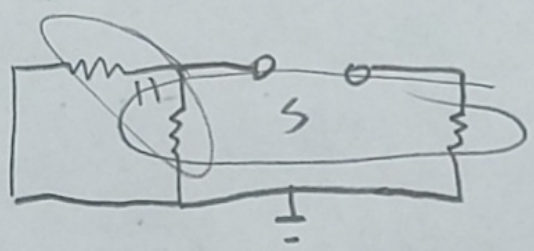
Chris Hunt Homework 8 ENGR 201

8.1) Find the Thevenin equivalent at a-b and solve for I_x



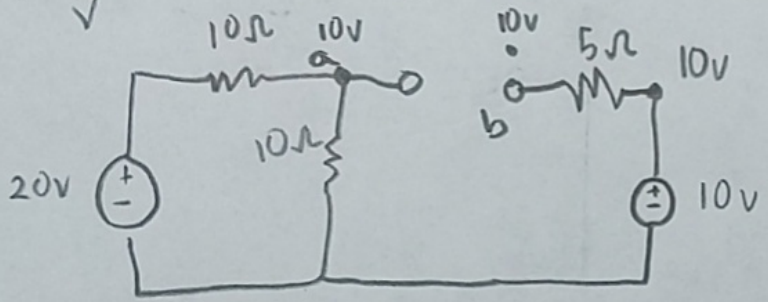
R_{Th})



$R_{Th} = 10\Omega \| 10\Omega + 5\Omega$

$R_{Th} = 10\Omega$

V_{Th})

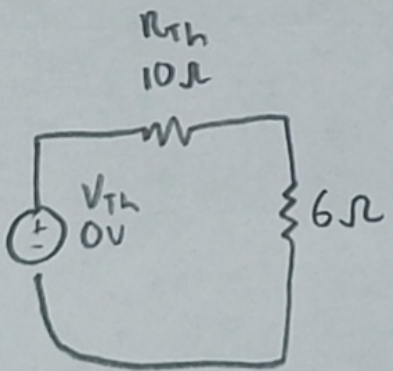


$V_a = 20V\left(\frac{10\Omega}{20\Omega}\right) \Rightarrow V_a = 10V$

$V_{Th} = V_a - V_b$

$V_b = 10V$

$V_{Th} = 0V$



$I_x = 0A$

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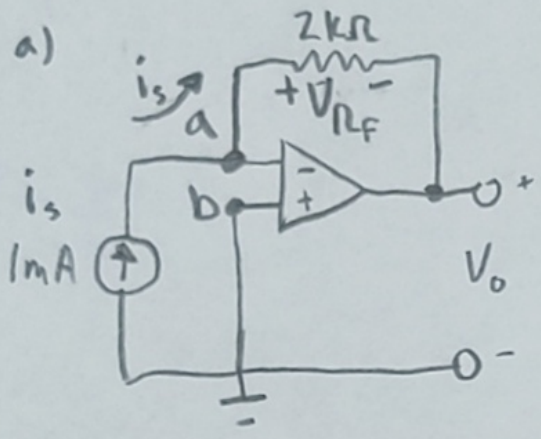
8.2) Obtain V_o

a)



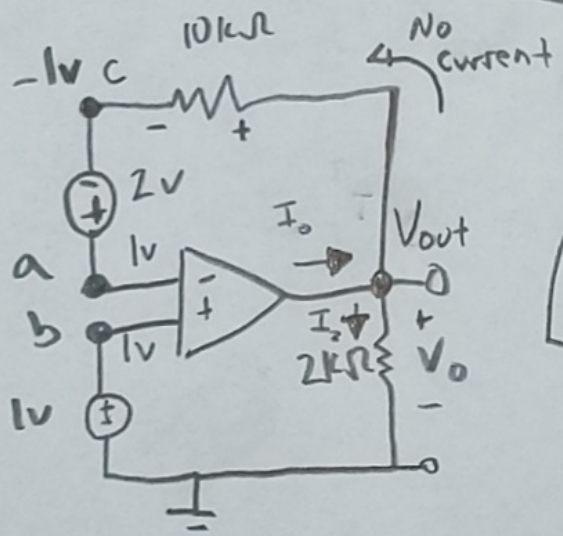
$V_a = V_b = 0V$

$V_{RF} = 1mA \cdot 2k\Omega$

$V_{RF} = 2V$

$V_o = V_a - V_{RF} \rightarrow$ **$V_o = -2V$**

b)



$V_a = V_b = 1V$

$V_c = V_{out} = -1V$

$V_o = -1V$

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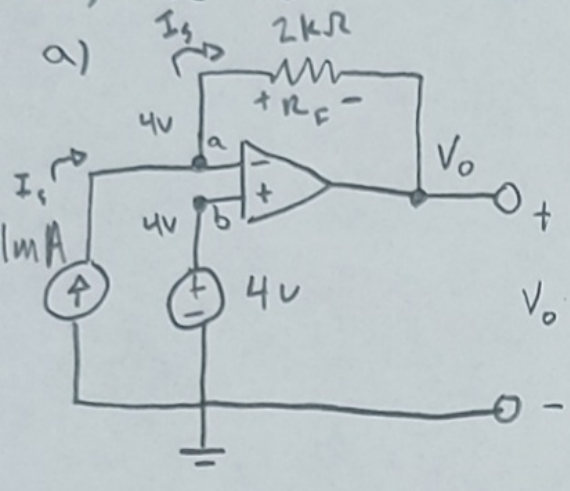
8.3) Find V_o

a)

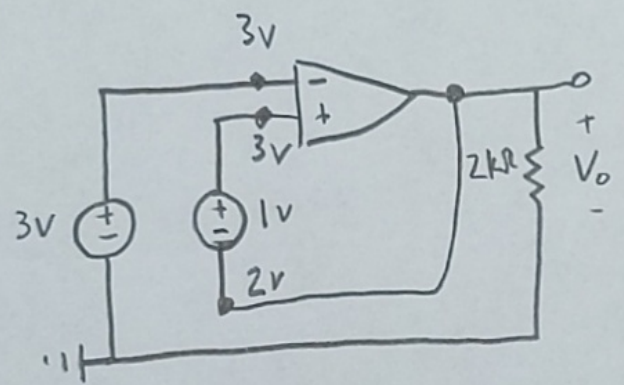


$V_o = V_a - V_{R_F}$

$V_o = 4V - 1mA(2k\Omega)$

$\boxed{V_o = 2V}$

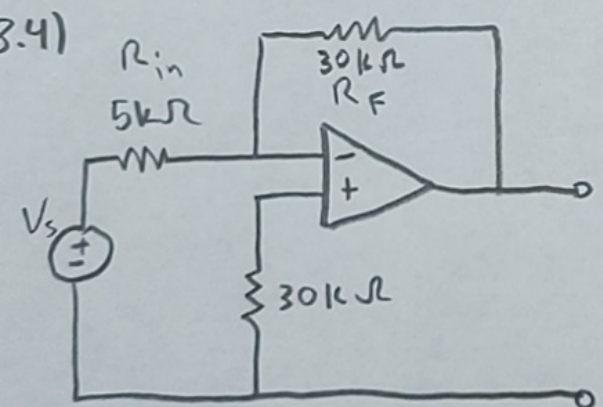
b)



$V_o = 3V - 1V$

$\boxed{V_o = 2V}$

8.4)



Find the voltage ratio $\frac{V_o}{V_s}$

$\frac{V_o}{V_s} = -\frac{R_F}{R_{in}}$

$\frac{V_o}{V_s} = -\frac{30k\Omega}{5k\Omega}$

$\boxed{\frac{V_o}{V_s} = -6}$

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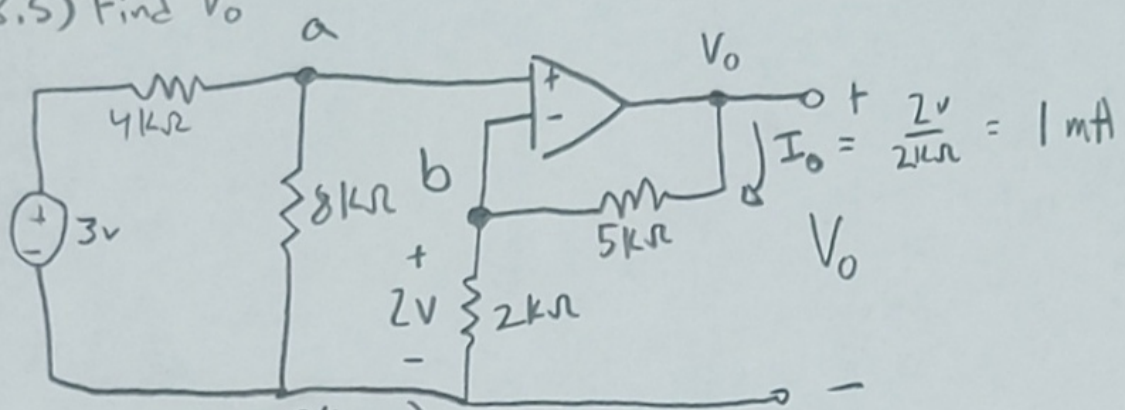
8.5) Find V_o



$V_a = 3v\left(\frac{8k\Omega}{12k\Omega}\right)$

$V_a = 2v$

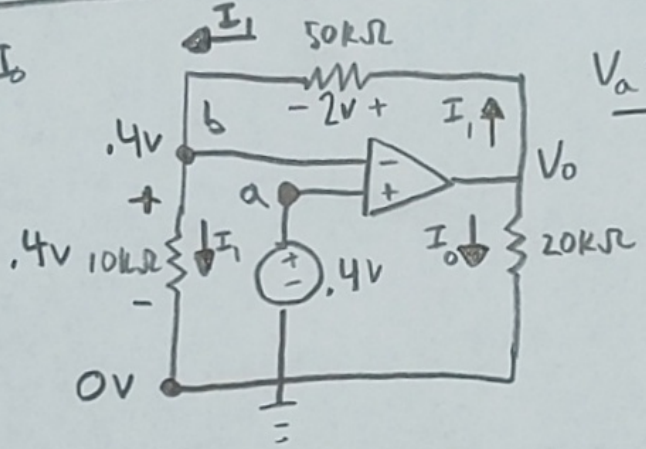
$V_b = 2v$

$V_o = V_b + 1mA \cdot 5k\Omega$

$V_o = 2v + 5v$

$\boxed{V_o = 7v}$

8.6) Find I_o



$V_a = .4v$ $V_b = .4v$

$I_1 = \frac{V_b - 0}{10k\Omega}$

$I_1 = \frac{.4}{10k\Omega}$

$I_1 = 40mA$

$V_o = V_b + 40mA \cdot 50k\Omega$ ←

$V_o = .4v + 2v$

$V_o = 2.4v$ → $I_o = \frac{V_o - 0}{20k\Omega}$

$I_o = \frac{2.4v}{20k\Omega}$ → $\boxed{I_o = .12mA}$