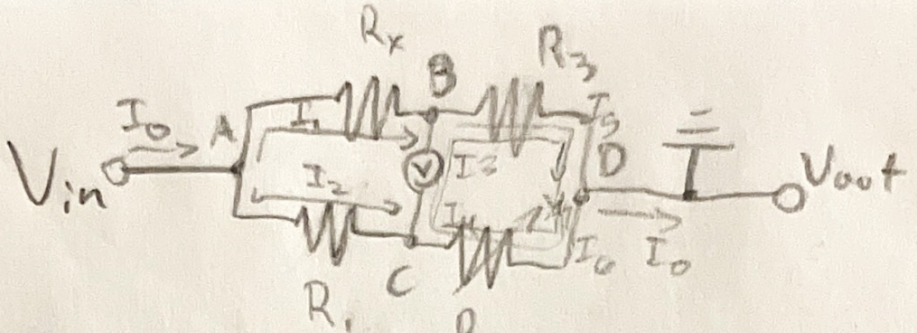
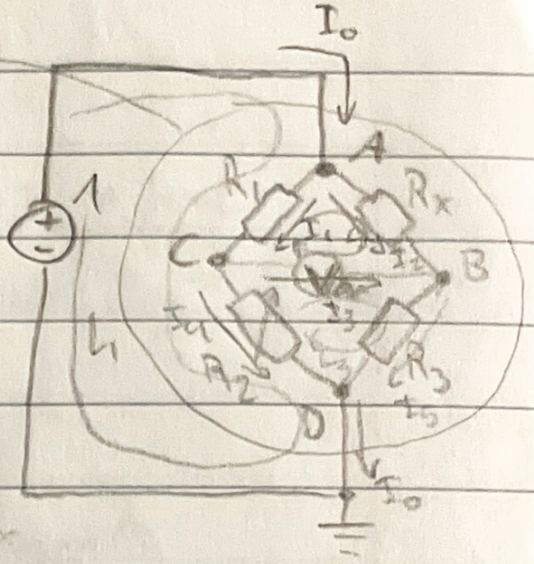


2/14/24 PHYS 605 HW2



1. $I_0 = I_1 + I_4$

$I_0 = I_2 + I_5$

$I_5 = I_2 + I_3$

$V_{in} - I_1 R_1 - I_4 R_2 = 0$

$V_{in} - I_2 R_x - I_5 R_3 = 0$

$V_{in} - I_1 R_1 - V_m - I_5 R_3 = 0$

a) $V_m = {}_A V_{CB} = \boxed{V_{in}\left(\frac{R_1}{R_1+R_2} - \frac{R_x}{R_x+R_3}\right)}$

b) $V_m = 0 = V_{in}\left(\frac{1k\Omega}{1k\Omega+R_2} - \frac{1.2k\Omega}{2.2k\Omega}\right)$

$\frac{1000}{1000+R_2} = \frac{1.2k}{2.2k} \Rightarrow R_2 = \frac{1000 \cdot 2.2}{1.2} - 1000 = \boxed{833.3\Omega}$

c) $V_m = \left(\frac{1k}{1k+0.833k} - \frac{1.1k}{2.1k}\right) V_{in} = V_{in} \cdot 0.0216\,V$