Prelab 3

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- Ohm's law, KCL, KVL.

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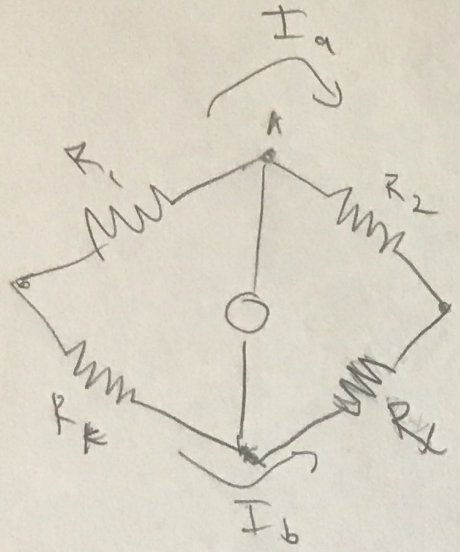

$V_a = V_b$

$I_a = \frac{V_0}{R_1 + R_2}$ $\quad I_b = \frac{V_0}{R_K + R_X}$

$$I_a R_1 + V_{ab} - I_b R_K = 0$$

$$\frac{V_0}{R_1 + R_2} R_1 - \frac{V_0}{R_K + R_X} R_K = 0$$

$$\frac{R_1}{R_1 + R_2} = \frac{R_K}{R_K + R_X}$$

$$R_1(R_K + R_X) = R_K(R_1 + R_2)$$

$$\cancel{R_1 R_K} + R_1 R_X = \cancel{R_K R_1} + R_K R_2$$

$$R_1 R_X = R_K R_2 \rightarrow \boxed{\frac{R_X}{R_K} = \frac{R_2}{R_1}}$$

$$P_{R_1} = I^2 R_1 = \left[\frac{V_0}{R_1+R_2}\right]^2 R_1$$

$$P_{R_2} = I^2 R_2 = \left[\frac{V_0}{R_1+R_2}\right]^2 R_2$$

$$P_{R_K} = I^2 R_K = \left[\frac{V_0}{R_K+R_x}\right]^2 R_K$$

$$P_{R_x} = I^2 R_x = \left[\frac{V_0}{R_K+R_x}\right]^2 R_x$$

$$P_T = 2\left[\frac{V_0}{R_1+R_2}\right]^2 (R_1+R_2) + 2\left[\frac{V_0}{R_K+R_x}\right]^2 (R_K+R_x)$$