3. Fruity Fred

(a) $R_{AB} = \rho\frac{L-kF}{A_c} + \rho\frac{L-kF}{A_c} = \frac{2\rho(L-kF)}{A_c}$

(b) $F = \frac{A_c V_{out}+2\rho L(V_{out}-1)}{2\rho k(V_{out}-1)}$

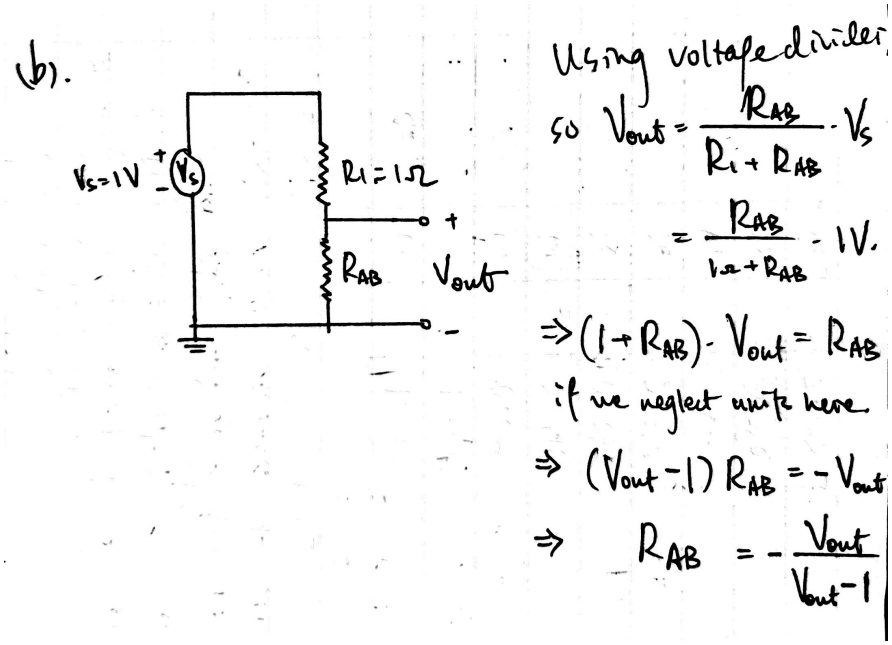

Figure 1: Circuit Designed

As deduced from the process on the picture, so $R_{AB} = -\frac{V_{out}}{V_{out}-1}$. Also, as we derived from part (a), which gives $R_{AB} = \frac{2\rho(L-kF)}{A_c}$. Thus, we have that:

$$R_{AB} = \frac{2\rho(L-kF)}{A_c} = -\frac{V_{out}}{V_{out}-1}$$

$$\implies 2\rho(L-kF)\cdot -(V_{out}-1) = A_c \cdot V_{out}$$

$$\implies (2\rho L - 2\rho kF)\cdot -(V_{out}-1) = A_c \cdot V_{out}$$

$$\implies -2\rho L(V_{out}-1) + 2\rho k(V_{out}-1)F = A_c \cdot V_{out}$$

$$\implies 2\rho k(V_{out}-1)F = A_c \cdot V_{out} + 2\rho L(V_{out}-1)$$

$$\implies F = \frac{A_c V_{out} + 2\rho L(V_{out}-1)}{2\rho k(V_{out}-1)}$$