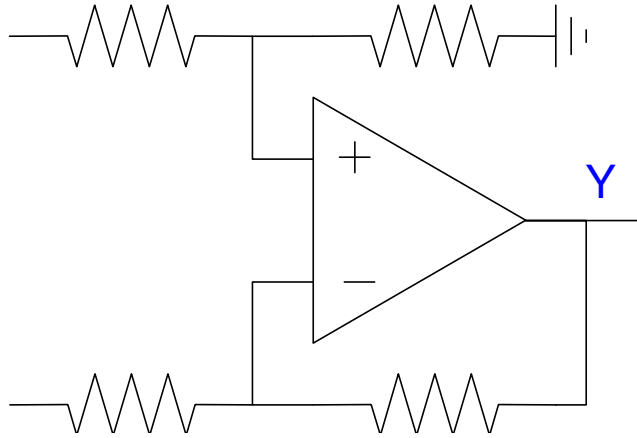


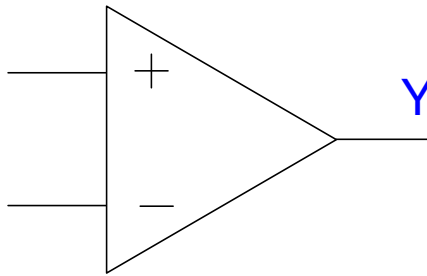
ECE 321: Handout #2

Amplifiers and Mixers

1) Design a circuit to implement $Y = 4X - 2$



2) Design a circuit to implement $Y = 4A + 3B + 2C$



Solution #1

1) Design a circuit to implement $Y = 4X - 2$

There are many ways to do this. One solution uses an instrumentation amplifier.

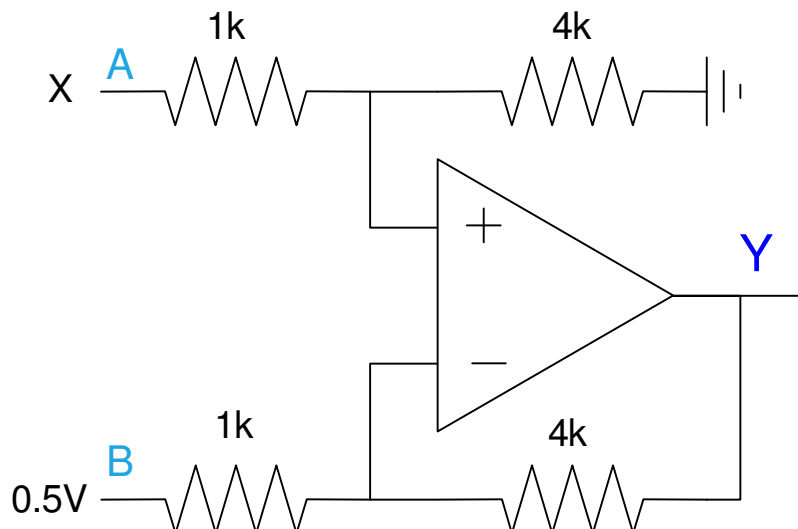
The gain of an instrumentation amplifier is

$$Y = \left(\frac{R_2}{R_1}\right)(A - B)$$

Rewrite as

$$Y = 4\left(X - \frac{1}{2}\right)$$

- The gain is 4 ($R_2/R_1 = 4$)
- X is the positive input (A)
- 1/2V is the negative input (B)



2) Design a circuit to implement $Y = 4A + 3B + 2C$

Again, there are many ways to do this. One solution is to

- Create a signal that's the weighted average of A, B, C

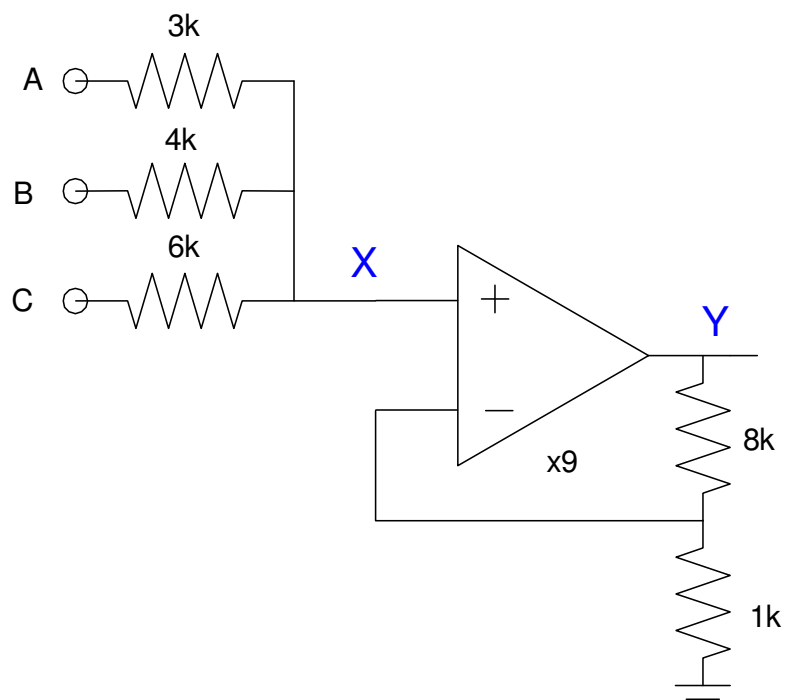
$$X = \left(\frac{4A+3B+2C}{9} \right)$$

Y is then

$$Y = 9X$$

Let $R = 12k$ (arbitrary)

- $R_a = 12k / 4 = 3k$
- $R_b = 12k / 3 = 4k$
- $R_c = 12k / 2 = 6k$



There are other solutions....