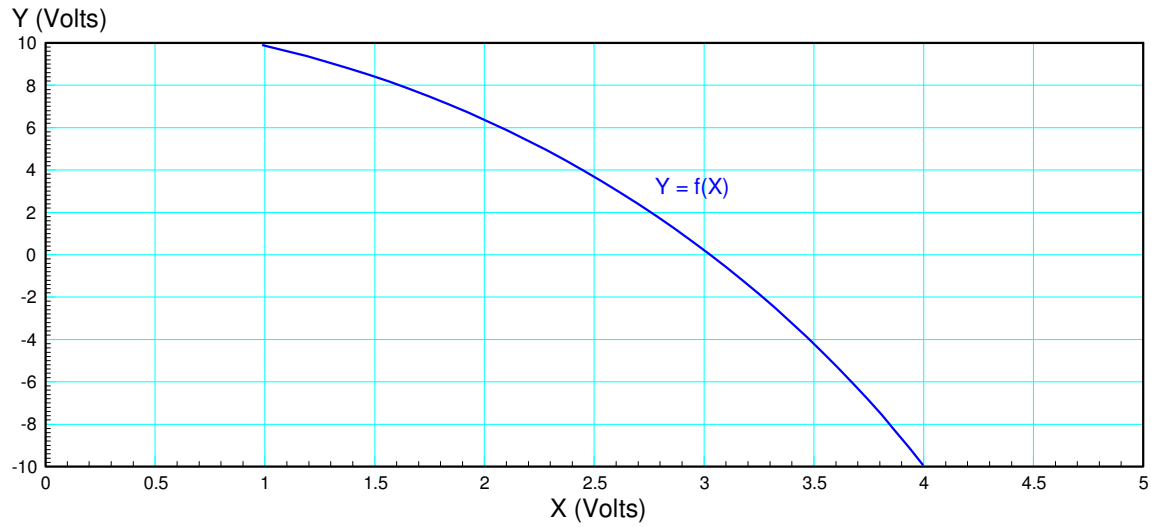


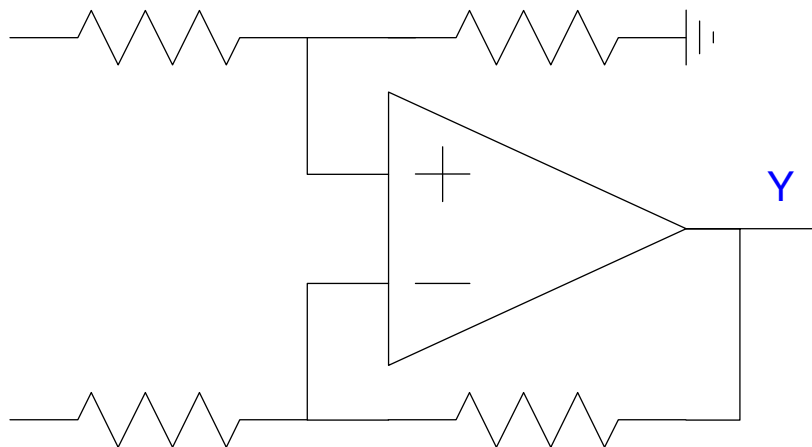
ECE 321: Handout #6

Calibration and Noise

- 1) Determine an equation to approximate the relationship $Y = f(X)$
 - If $X = 2.5V$, what is the actual output (Y) and the output $f(X = 2.5V)$?



- 2) Design a circuit to implement this function where $Y =$ the temperature (-10V to +10V)

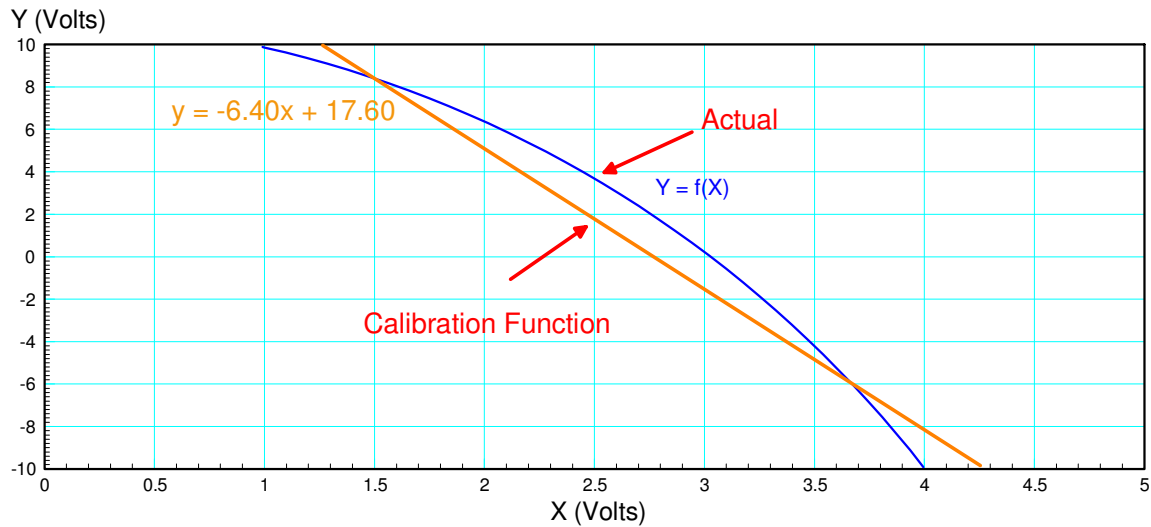


Solution

1) Determine an equation to approximate the relationship $Y = f(X)$

If $X = 2.5\text{V}$, what is the actual output (Y) and the output $f(X = 2.5\text{V})$?

- Actual: $Y = 3.8\text{V}$ (from the graph)
- Calibration Function: $Y = 1.8\text{V}$ (from graph)



Find a line that passes through the points $(1.5\text{V}, +8.0\text{V})$, $(4.0\text{V}, -8.0\text{V})$

$$y = ax + b$$

Plug in the points

$$+8 = 1.5a + b$$

$$-8 = 4.0a + b$$

Solve 2 equations for 2 unknowns

$$a = -6.40$$

$$b = 17.6$$

$$y = -6.40x + 17.6$$

2) Design a circuit to implement $y = f(x)$

$$y = -6.40x + 17.6$$

Rewrite as

$$y = 6.40(2.75 - x)$$

For an instrumentation amplifier

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

