Lesson 1.1 – Average Rate of Change

Precalculus questions: How does a function *change* from one input to another, and at what *average rate* does the change occur?
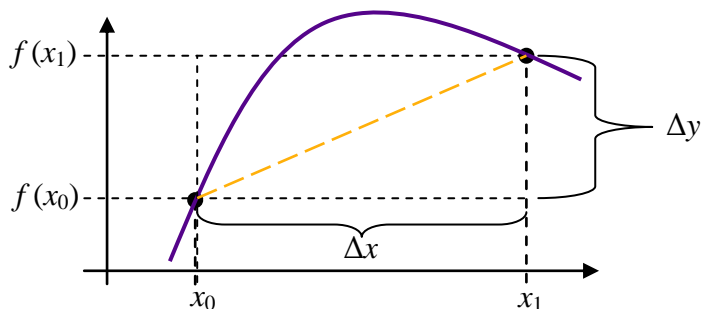
Let $y = f(x)$, and let two inputs $x_0 \neq x_1$ be given.

The **net change** in y on the interval $[x_0, x_1]$ is

$$\Delta y = f(x_1) - f(x_0)$$
$$= (\text{later output}) - (\text{earlier output})$$

(Units: Same as y.)

The **average rate of change** in y on the interval $[x_0, x_1]$ is

$$\frac{\Delta y}{\Delta x} = \frac{f(x_1) - f(x_0)}{x_1 - x_0} = \frac{rise}{run}$$

(Units: Units of y "per" unit of x.)

Notes:

1. For change and average rate of change in y, a positive sign implies a net increase in y, and a negative sign implies a net decrease in y.

2. Change and average rate of change describe the relationship between initial and final values, but not intermediate behavior of the graph within the interval. (We need calculus for that.)

3. An average rate of change measures "how fast" a function is rising or falling over a given interval, on average.