Rates of Change

Last class we talked about the derivative as the slope of the tangent line to a graph. This class we'll continue our discussion of derivatives by explaining how a derivative can be a rate of change. This some of the most important information presented in this class.

Remember that when we talked about the slope of a graph $y = f(x)$ we started by talking about the change in y and the change in x. If changing x at a certain rate causes y to change, we're interested in the *relative* rate of change, $\frac{\Delta y}{\Delta x}$.

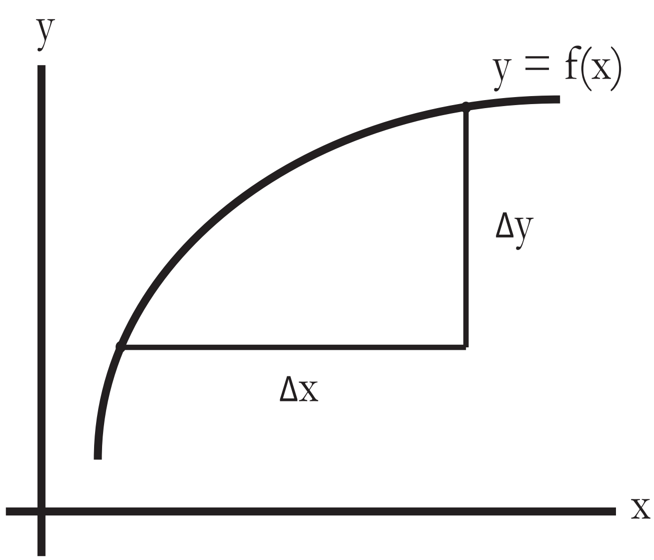

Figure 1: Graph of a generic function, with Δx and Δy marked on the graph

Another way to think about $\frac{\Delta y}{\Delta x}$ is as the average change in y over an interval of size Δx. This comes up frequently in physics, in which x is measuring time and $\frac{\Delta y}{\Delta x}$ is the average change in position over an interval of time – in other words, it's the rate at which something is moving. In this case, the limit

$$\frac{dy}{dx} = \lim_{\Delta x \to 0} \frac{\Delta y}{\Delta x}$$

measures the instantaneous rate of change, or the speed.