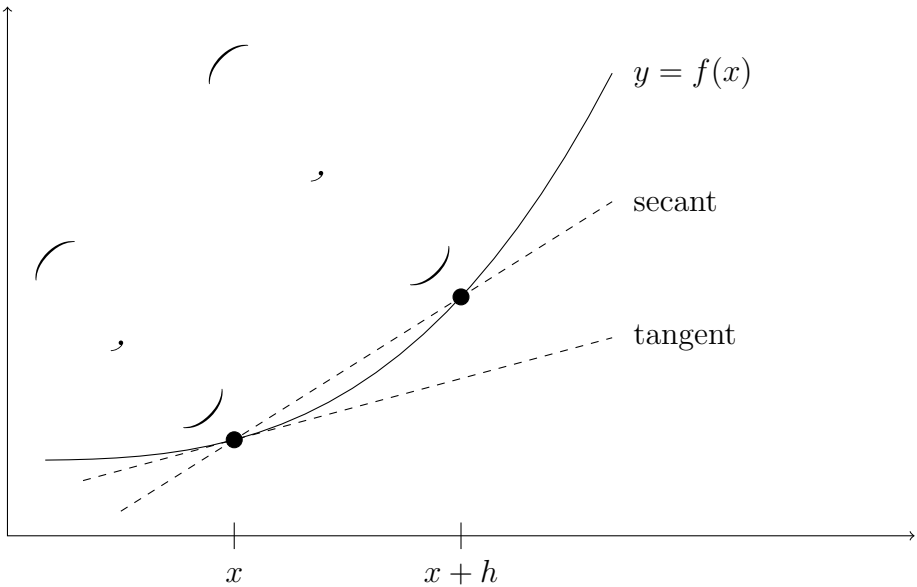# The Limit Definition of Derivative

Suppose the height of a ball is a function of time $y = f(x)$.
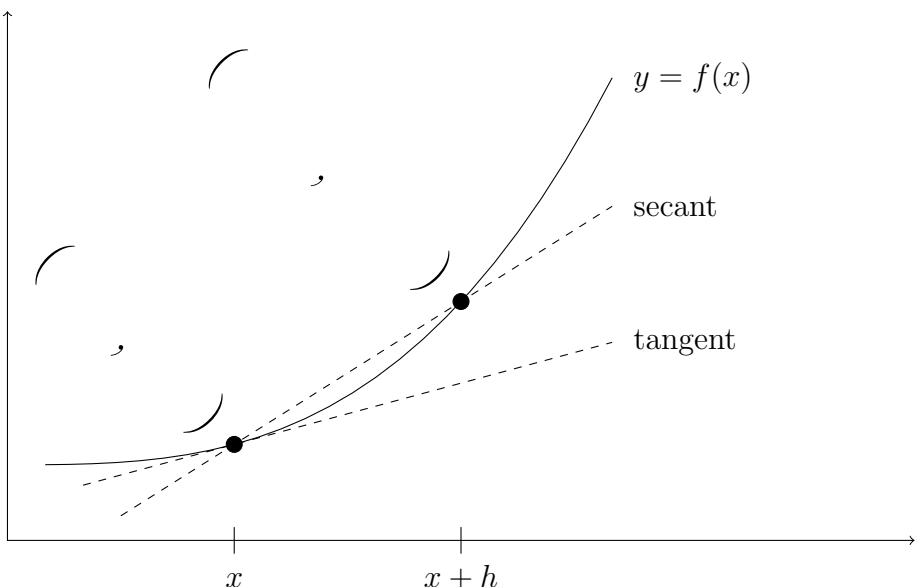

$$\frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1} =$$

$$\underline{\hspace{4cm}} = \begin{array}{c}\text{slope of} \\ \text{secant}\end{array} = \begin{array}{c}\text{difference} \\ \text{quotient}\end{array} = \begin{array}{c}\text{average} \\ \text{rate of} \\ \text{change}\end{array} = \begin{array}{c}\text{average} \\ \text{velocity}\end{array}$$

$$\lim_{h \to} \underline{\hspace{3cm}} = \begin{array}{c}\text{slope of} \\ \text{tangent}\end{array} = \text{derivative} = \begin{array}{c}\text{rate of} \\ \text{change}\end{array} = \text{velocity}$$