MAP-4384 Quiz 1

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1 Approximation Of The Derivative

The derivative of a continuous function f is defined by the following equation.

$$f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h} \tag{1}$$

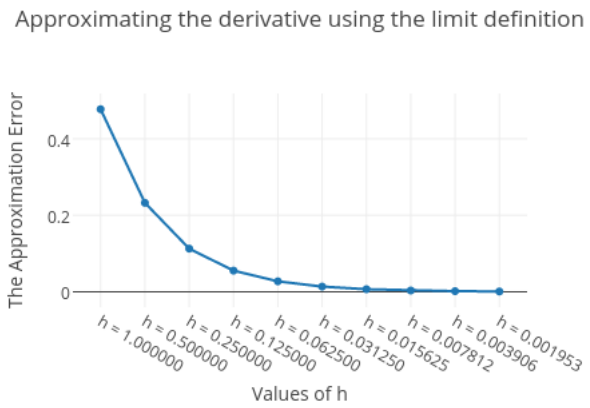
So, if we would like to approximate the derivative of a continuous function f at a point x, then we may use the formula

$$f'(x) \approx f_a(x) = \frac{f(x+h) - f(x)}{h} \tag{2}$$

For some h. As $h \to 0$, $f'_a(x) \to f(x)$. We can determine the error of our approximation, ϵ with the formula

$$\epsilon = |f'(x) - f_a(x)| \tag{3}$$

Below is a graph of the error, ϵ of the aprixmate derivative of $\sin(\pi/3)$.



As we can see, as $h \to 0$, $\epsilon \to 0$.