2.1 Derivatives

The derivative of a function f at a number a is:

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

Or, alternatively:

$$f'(a) = \lim_{x \to a} \frac{f(x) - f(a)}{x - a}$$

Geometric Interpretations of the derivative:

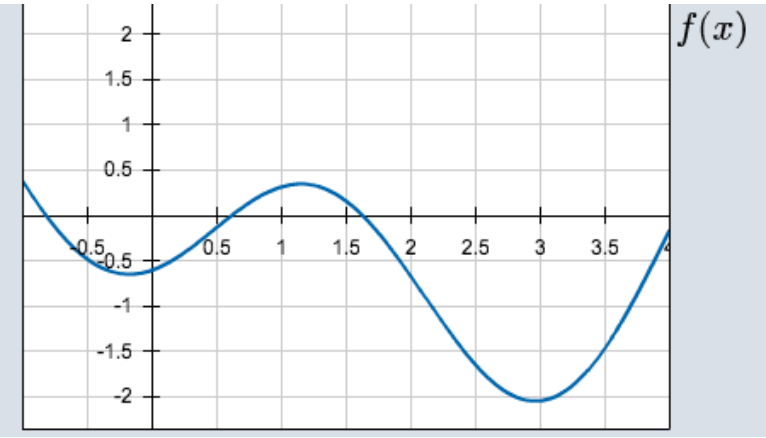
1. **Slope of a tangent –**

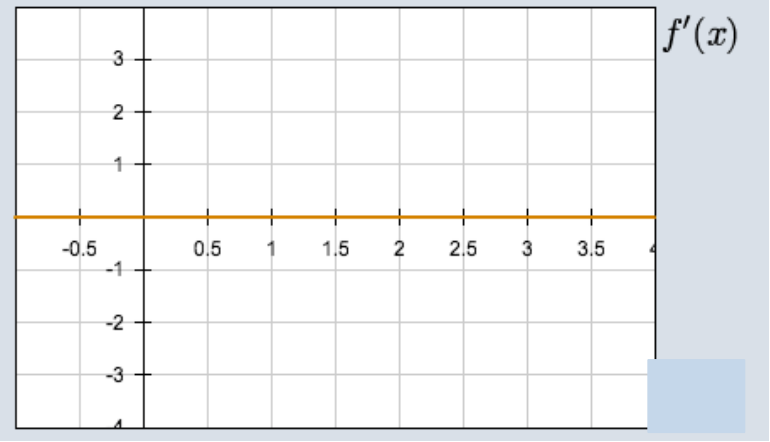
2. **Rate of Change –**

The Derivative as a function –

Given a function f, the derivative of f is the function f' defined by

Use the given graph of f to sketch the graph of f'.





Ways to denote the derivative of $y = f(x)$

Ways to denote the value of a derivative at a specific number *a*

If $f(x) = x^2 - 3x$, find $f'(x)$. Then use it to find $f'(3)$

Differentiable Functions –

Easy to tell from a graph where a function is NOT differentiable: