Recall: The derivative of the function $f(x)$ at $x = a$ is:

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

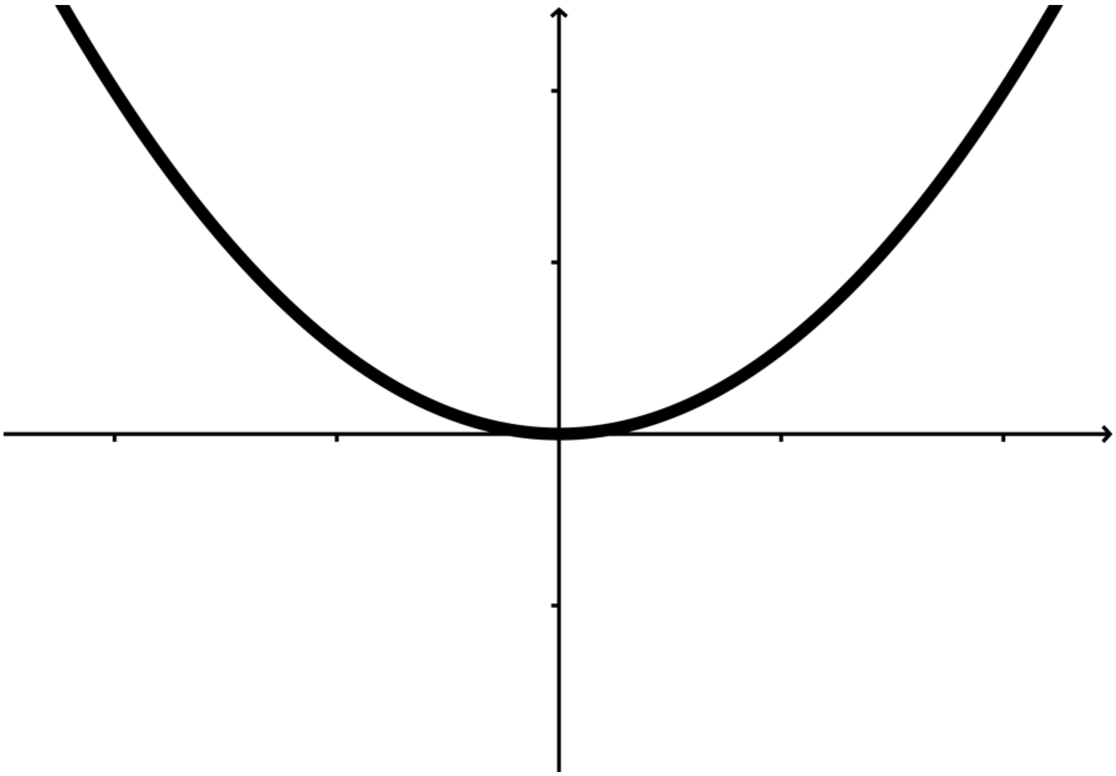
For each input value, x, we can compute an output value which is $f'(x)$ using the definition above.

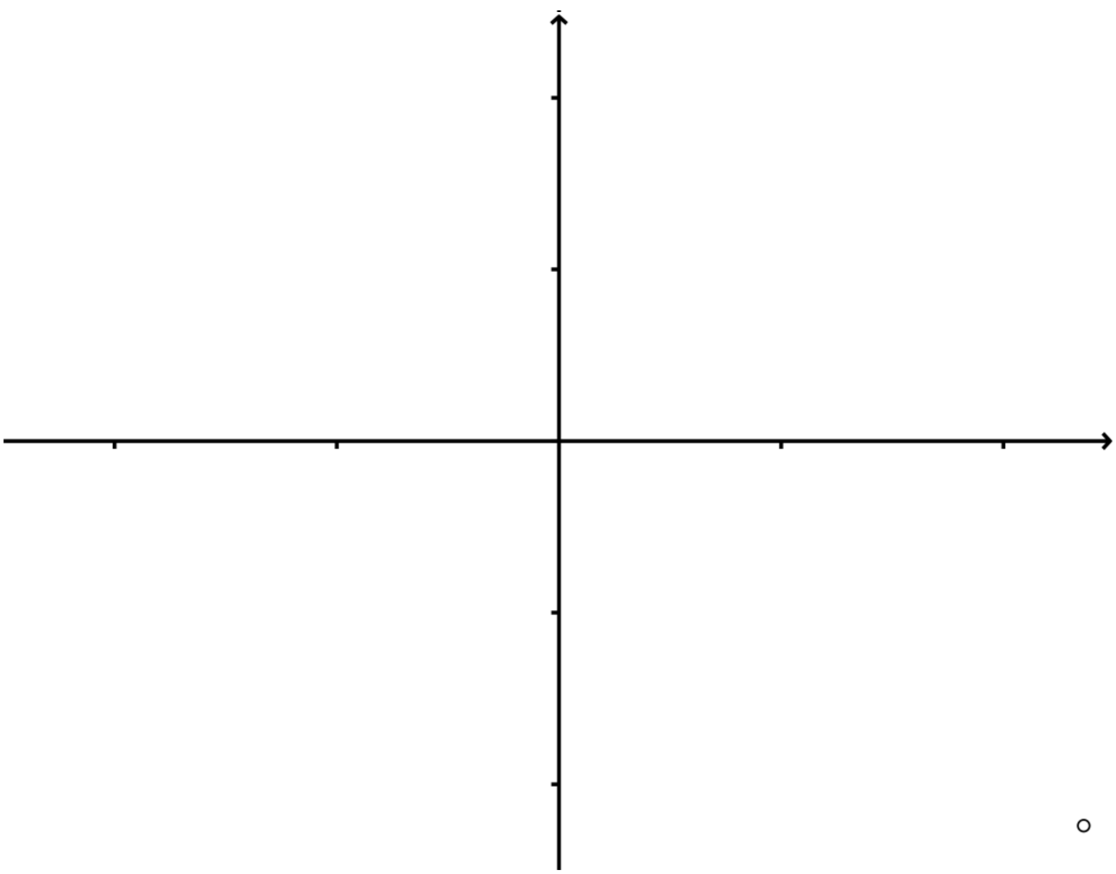
Recall: Definition: A <u>function</u> is a mathematical rule which assigns to each input value an output value.

The derivative $f'(x)$ is a function.

$$f'(x) =$$

Example: Find the derivative of the function $f(x) = x^2$

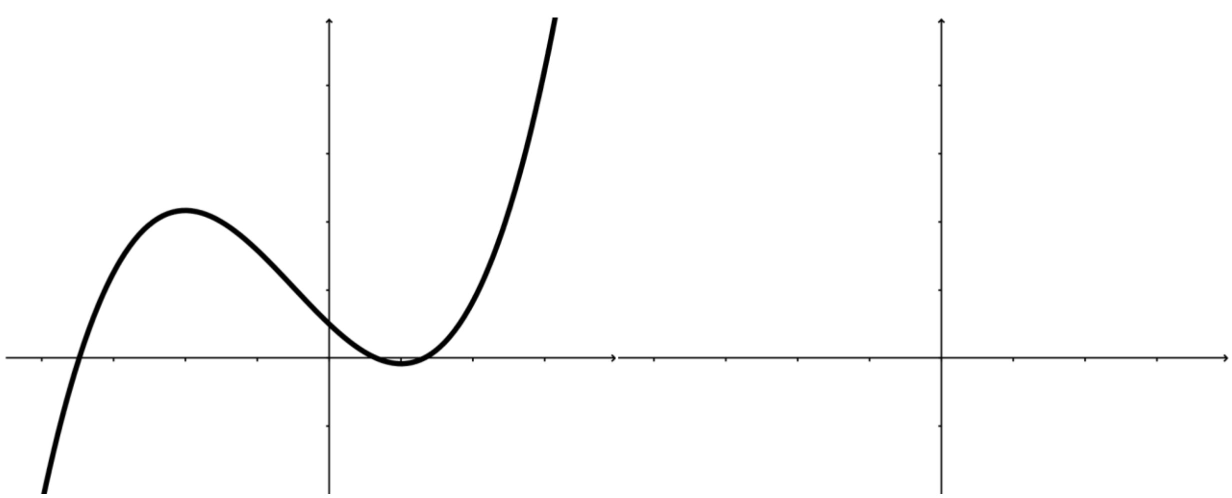




Old: We say that a function, $y = f(x)$, is increasing if the ave. rate of change $\frac{\Delta y}{\Delta x} > 0$.

We say that a function, $y = f(x)$, is decreasing if the ave. rate of change $\frac{\Delta y}{\Delta x} < 0$.

New:



Recall: The derivative, $f'(x)$, can be interpreted as the (instantaneous) rate of change of $f(x)$.

Just like our original rate of change (slope);

The units of $f'(x) =$

Notation: $f'(x) =$

Example 1: For the cost function $C(q)$

$C(q) =$ Cost to produce quantity q items (units in dollars)

$q =$ quantity of items produce (units in items)

The units of $C'(q) =$

Example 2: For the position function $s(t)$

$s(t) =$ position at time t (units in feet)

$t =$ seconds

The units of $s'(t) =$