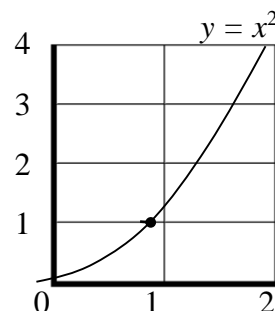




Examples 2.1 – Derivatives of Quadratic Functions

1. For the function $f(x) = x^2$, calculate the average rates of change for points closer and closer to and on either side of $x_0 = 1$. Guess $f'(1)$.

Solution:



x	0.9	0.99	0.999	\rightarrow	$x_0 = 1$	\leftarrow	1.001	1.01	1.1
$\Delta y / \Delta x$				\rightarrow	$f'(1) =$	\leftarrow			

2. Verify the guess in Part 1 by using the formula for the derivative of a quadratic.

Solution:

3. The time it takes an average athlete to swim 100 meters freestyle at age x years can be modeled by $T(x) = 0.181x^2 - 8.463x + 147.376$ seconds.

- (a) Find the rates of change for a 13-year-old and a 25-year-old swimmer.
 (b) At what age is the swim time the least? What is the swim time at that age?

Solution: (a)

(b)

Note: In general, the x -intercepts of the derivative function tell where the original function has horizontal tangent lines.