

Find the average rate of change of $y = e^x$ over each interval. Leave your answer in terms of e .

1) $[-2, 0]$

2) $[1, 3]$

Find the average rate of change of $y = \cot x$ over each interval.

3) $[\frac{\pi}{4}, \frac{3\pi}{4}]$

4) $[\frac{\pi}{6}, \frac{\pi}{2}]$

For each of the following, use the limit definition of derivative to find the slope at the indicated point.

5) $y = x^2 + 2x$ at $x = 2$

6) $y = \frac{1}{x-1}$ at $x = 2$

$$7) y = -4x^2 - 5x - 2 \text{ at } x = 1$$

$$8) y = \sqrt{-3x-5} \text{ at } x = -3$$

9) Find the instantaneous rate of change for $f(x) = \sqrt{x}$ at $x = 9$.

10) An object is dropped from the top of a 150-meter tower. Its height above the ground t seconds after being dropped is modeled by $s(t) = 150 - 4.9t^2$. How fast is the object falling 2 seconds after it was dropped?

CHALLENGE! What is the instantaneous rate of change at $x = 2$ of the function f given by $f(x) = \frac{x^2 - 2}{x - 1}$?