

2.1 Average and Instantaneous Rate of Change

Calculus

Name: _____

CA #2

Find the average rate of change of each function on the given interval. Use appropriate units if necessary.

1. $h(x) = x^2 - 2$; $[-1, 3]$

2. $f(x) = \cos x$ on the interval
 $3 \leq x \leq 5$.

3. $b(w) = w + 2^w$; $[-1, 2]$
 w represents window panes
 b represents cleaning bottles

Find the instantaneous rate of change of each function at the given x -value. Use the form $\lim_{h \rightarrow 0} \frac{f(a+h)-f(a)}{h}$.

4. $f(x) = \frac{3}{x}$ at $x = 4$

5. $f(x) = 4x^2 - 1$ at $x = 2$

Find the instantaneous rate of change of each function at the given x -value. Use the form $\lim_{x \rightarrow a} \frac{f(x)-f(a)}{x-a}$.

6. $f(x) = \sqrt{5x}$ at $x = 1$

7. $f(x) = 4x - x^2 + 2$ at $x = -2$

Each limit represents the instantaneous rate of change of a function. Identify the original function, and the x -value of the instantaneous rate of change.

8. $\lim_{x \rightarrow -1} \frac{x^3 - 2x^2 + 3}{x+1}$ Function: $f(x) =$

Instantaneous rate at $x =$

9. $\lim_{x \rightarrow 5} \frac{\frac{1}{x-3} - \frac{1}{2}}{x-5}$ Function: $f(x) =$

Instantaneous rate at $x =$

10. $\lim_{h \rightarrow 0} \frac{\cos(\pi+h)+1}{h}$

Function: $f(x) =$

Instantaneous rate at $x =$

11. $\lim_{h \rightarrow 0} \frac{2 \ln(1+h)-0}{h}$

Function: $f(x) =$

Instantaneous rate at $x =$

7. 8	8. $f(x) = x^3 - 2x^2 + 3$ $x = -1$	9. $f(x) = \frac{1}{x-3}$ $x = 5$	10. $f(x) = \cos x$ $x = \pi$	11. $f(x) = 2 \ln x$ $x = 1$
1. 2	2. 0.636 or 0.637	3. $\frac{6}{13}$ bottles per window	4. $-\frac{16}{3}$	5. 16
				6. $\frac{2\sqrt{5}}{5}$