2.1 Average and Instantaneous Rate of Change

Calculus   Name: _____

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

1. $g(x) = 4 - x^2$; $[1,2]$

2. $f(x) = \sin x$ on the interval $2 \le x \le 5$.

3. $s(t) = t^2 - 5t + 4$; $[-1,3]$
   t represents minutes
   s represents meters

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

4. $f(x) = \frac{1}{3x}$ at $x = 4$

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

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

6. $f(x) = 7\sqrt{x}$ at $x = 2$

7. $f(x) = 5x - 2x^2$ 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. $\lim\limits_{x \to 1} \frac{\frac{1}{10+x} - \frac{1}{11}}{x-1}$ Function: $f(x) =$

Instantaneous rate at $x =$

9. $\lim\limits_{h \to 0} \frac{2^{5+h} - 2^5}{h}$ Function: $f(x) =$

Instantaneous rate at $x =$

10. $\lim\limits_{h \to 0} \frac{2(6+h)^2 + (6+h) - 3 - (75)}{h}$

Function: $f(x) =$

Instantaneous rate at $x =$

11. $\lim\limits_{x \to -3} \frac{(4x^2 + 2x) - (30)}{x+3}$

Function: $f(x) =$

Instantaneous rate at $x =$