Lesson #19 HW Name_____

Per. ____

Average and Instantaneous Rates of Change

1. Consider the function $y = 2x^2$

A) Find the average rate of change of *y* with respect to *x* over the interval [0,1].

B) Find the instantaneous rate of change of *y* with respect to *x* for any general point *a*.

C) Find the instantaneous rate of change of *y* with respect to *x* when *x* = 0.

2. Consider the function $y = \frac{1}{x}$

A) Find the average rate of change of *y* with respect to *x* over the interval [2,3].

B) Find the instantaneous rate of change of *y* with respect to *x* for any general point *a*.

C) Find the instantaneous rate of change of *y* with respect to *x* when x = 2.

3. Consider the function $f(x) = x^3 - 1$

A) Find a formula for the slope of the tangent line to the graph of *f* at any general point *a*.

B) Use the formula obtained in part A) to find the slope of the tangent line when x = -1

4. Consider the function $f(x) = \sqrt{x}$

A) Find a formula for the slope of the tangent line to the graph of *f* at any general point *a*.

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B) Use the formula obtained in part A) to find the slope of the tangent line when x = 1

5. During the first 40 seconds of a rocket flight, the rocket is propelled straight up so that in t seconds it reaches a height of $s(t) = \frac{t^3}{\sqrt{10}}$ feet. *You may use a calculator on this question.*

What is the average velocity of the rocket during the first 40 seconds?

6. A particle moves in the positive direction along a straight line so that after t minutes its distance is $s(t) = 6t^4$ feet from the origin.

A) Find the average velocity of the particle over the interval [2,4].

B) Find the instantaneous velocity at t = 2.

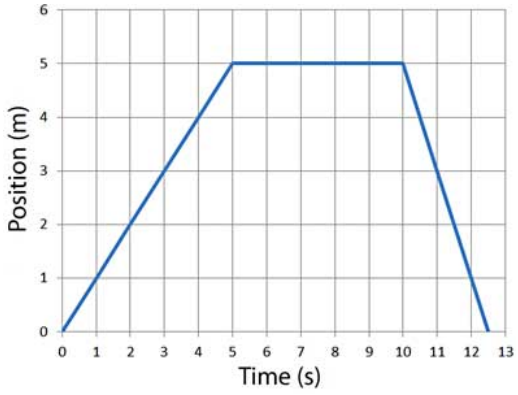
7. Suppose $\lim_{x\to 0} \frac{g(x)-g(0)}{x} = 1$. Which of the following must be true? Explain your choice.

A) g is not defined at x = 0.
B) g is not continuous at x = 0.
C) The limit of $g(x)$ as x approaches 0 equals 1
D) The instantaneous rate of change of g when x = 0 is equal to 1.
E) The average rate of change of g on the interval [0,x] is equal to 1.

8. Suppose that $\lim_{x\to 2} \frac{f(x)-f(2)}{x-2} = 5$. Which of the following must be true? Explain your choice.

A) The limit of *f(x)* as x approaches 2 does not exist.
B) f is not defined at x = 2
C) $f(2) = 5$
D) The secant slope of f on interval [2,5] is equal to 5
E) The slope of the line tangent of f when x = 2 is equal to 5

9. Consider the Position vs. Time graph below that models the position of particle, in meters, over time, in seconds.



A) Find the average velocity of the particle on the interval [3, 10].

B) Find the instantaneous velocity when t = 4.

C) Find the instantaneous velocity when t = 8.

D) Find the instantaneous velocity when t = 11.5.