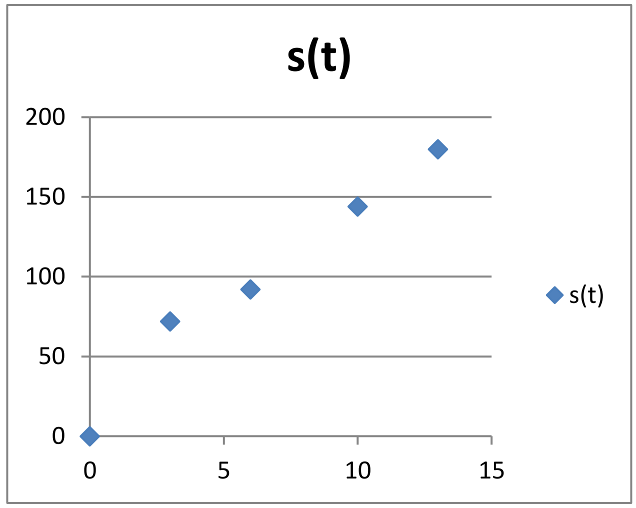
Chapter 2: Key Concept: The Derivative
Practice Test Name______________________________________

LT #1 and LT #3: I can calculate the average velocity or average rate of change on a given time interval using a table, a graph or an algebraic rule and show a graphical representation of the meaning of this calculation.

1. At time t in seconds, a particle's distance $s(t)$ in cm, from a point is given in the table.

t	0	3	6	10	13
$s(t)$	0	72	92	144	180



a. What is the average velocity of the particle from $t = 6$ to $t = 10$? Show your calculation.

b. Indicate what you have found graphically with a secant line.

c. Draw a slope segment on the graph to represent $s'(6)$

2. For $f(x) = \ln\left(x^2 + 7\right)$, what is the average rate of change of this function between $x = 1$ and $x = 3$. Show the calculation that leads to your answer. **Your answer should be accurate to 3 decimal places.**

3. For $f(x) = \ln\left(x^2 + 7\right)$, what is the instantaneous rate of change of this function at $x = 2.5$? **Your answer should be accurate to 3 decimal places.**

LT #2: I can approximate instantaneous velocity or instantaneous rate of change at a given point using a table or an algebraic rule. I know how to use a graphing calculator efficiently for this type of calculation.

4. For $s(t) = 3e^t - 1$, find the average velocity between $t = 2$ and $t = 2 + h$ if:
(Report answers accurate to three decimal places.)

a. $h = 0.1$ b. $h = 0.01$ c. $h = 0.001$

LT #4: I can use $\frac{dy}{dx}$ on a graphing calculator to find the slope of a curve at a point.

For $s(t) = 3e^t - 1$, what is $s'(2)$? (Use your graphing calculator and the tool: $\frac{dy}{dx}$.) ***(Report answers accurate to three decimal places.)***

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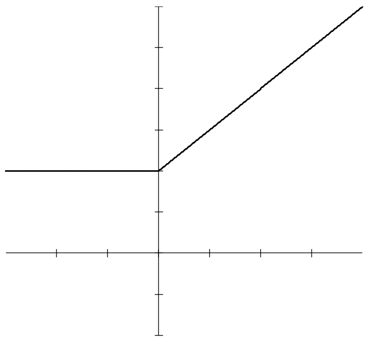
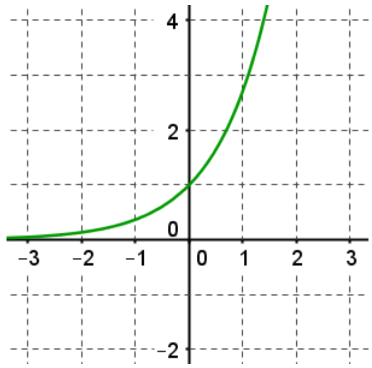
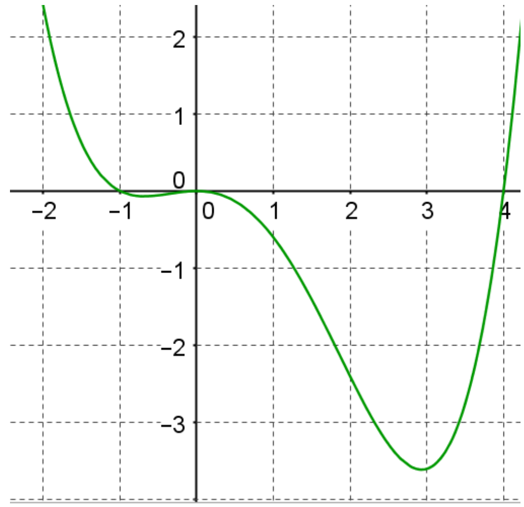
LT #5: I can sketch the graph of a derivative when given the graph of the function.

5. Sketch the first and second derivative of each function below.







LT #6: I can interpret the meaning of the function, the first derivative, and the second derivative at a point.

6. For some painkillers, the size of the dose, *D*, given depends on the weight of the patient, *W*. Thus, *D* = *f* (*W*), where *D* is in milligrams and *W* is in pounds.

   (A) Interpret the statements $f(140) = 120$ and $f'(140) = 3$ in terms of this painkiller.

   (B) What does the statement $f''(140) = -0.5$ tell you about this painkiller?

LT #7: I can sketch the graph of a function when given a description of the function in terms of continuity, differentiability and signs of the first and second derivatives.

7. Sketch the graph of an even function that is continuous on [-5,5] such that g(-2) = 1, g(0) = 3, and g(5) = 7. On [-5, -3] $g'(x) < 0$ and $g''(x) > 0$. On [-3, 0], $g'(x) > 0$ and $g''(x) < 0$.

LT #8: I can state what it means for a function to be differentiable at a point both graphically and algebraically.

8. List five types of points of non-differentiability.

9. Sketch an example of each type of point of non-differentiability.