Name: _____ Date: _____ Row: _____ Period: _____ Assignment #: _____

REVIEW WS: SECTIONS 3.1-3.2

YOU MUST SHOW ALL WORK ON A SEPARATE SHEET OF PAPER

SECTION 3.1

Need to use the definition of the derivative.

1) Find the slope of the tangent line to $f(x) = x^2 + 2x$ at $x = 3$.

2) Find $\lim_{h \to 0} \frac{f(a+h) - f(a)}{h}$ where $f(x) = \frac{1}{x-1}$ and $a = 2$.

3) For $G(x) = 4x + 3$

a) Find the slope of the tangent line to G at $a = 2$.

b) What is the slope of the tangent line at any point a?

4) Find the instantaneous velocity at time 3 seconds if a particle's position at time t is $f(t) = t^2 + 2t$ feet. See question 1.

5) a) A particle is moving along a scale in such a way that at time t, its position is $f(t) = 6t^2 - 4t + 1$ feet. Find the average velocity over each of these intervals of time:

$[1, 4]$

$[1, 2]$

$[1, 1.2]$

$[1, 1.01]$

b) Find the instantaneous velocity of the particle at $t = 1$ second.

6) Fred is driving along a freeway. At 3:00 he passes mile marker 120 and at 5:00 he passes mile marker 250.

a) What was his average velocity during that time interval?

b) When Fred passed mile marker 162, he saw that his speedometer read 54 mi/hr. What does 54 represent?

7) True or False:

$$f'(a) = \lim_{h \to 0} \frac{f(h) - f(a)}{h}$$

8) Find $f'(3)$ for $f(x) = x^2 + 10x$.

9) Find $f'(a)$ for $f(x) = 2x - x^2$.

10) The population $p(t)$ of the village of Rosebush is given by the table below. Estimate the derivative for 1999.

t	$P(t)$
1996	841
1997	832
1998	821
1999	810
2000	801
2001	793

11) The slope of the tangent line to the graph of f at the point a is _____.

12) True or False:
$f'(x)$ measures the average rate of change of $y = f(x)$ with respect to x.

13) Given that $f'(x) = 3x^2 + 2$ for $f(x) = x^3 + 2x + 1$, find:

a) the slope of the tangent line to f at the point corresponding to $x = 2$.

b) the equation of the tangent line to f at the point corresponding to $x = 2$.

c) the instantaneous rate of change of $f(x)$ with respect to x at $x = 3$.

d) If $f(x)$ represents the distance in feet of a particle from the origin at time x, find the instantaneous velocity at time $x = 4$ seconds.

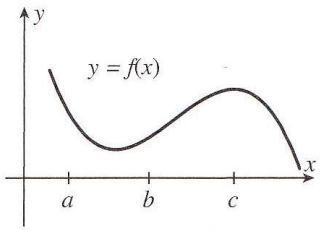
14) An arrow is shot straight up into the air and falls back to earth after 8 seconds. Its height above the archer after t seconds is $H(t)$.

a) What is the meaning of $H'(2)$?

b) What is $H'(9)$?

c) Is there a time a between 0 and 8 seconds for which $H'(a) = 0$?

15)



For the function f given above, which is largest: $f'(a)$, $f'(b)$, or $f'(c)$?

SECTION 3.2

1) True or False:

$$f'(x) = \lim_{\Delta x \to 0} \frac{f(x + \Delta x) - f(x)}{\Delta x}.$$

2) Is $f(x) = \sqrt{x}$ differentiable at $x = 0$?

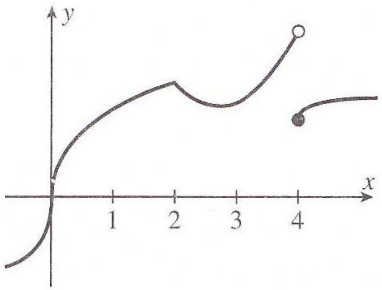
3) True or False:
For $y = f(x)$ the notation $f'(x)$ and $\frac{dx}{dy}$ have the same meaning.

4) Can a function be continuous at $x = 3$ but not differentiable at $x = 3$?

5) Can a function be differentiable at $x = 3$ and not continuous at $x = 3$?

6) True or False:

For the function f graphed below:



a) f is continuous at 0.

b) f is differentiable at 0.

c) f is continuous at 2.

d) f is differentiable at 2.

e) f is continuous at 3.

f) f is differentiable at 3.

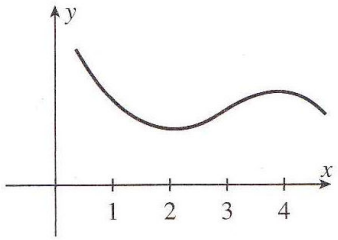
g) f is continuous at 4.

h) f is differentiable at 4.

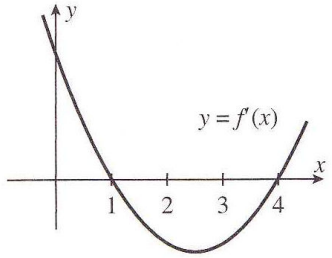
i) f is differentiable on $[1, 3]$

j) f is differentiable on $[2.5, 3.5]$

7) From the graph of f below, estimate $f'(1)$, $f'(2)$, $f'(3)$, and $f'(4)$, and then sketch a graph of $y = f'(x)$.



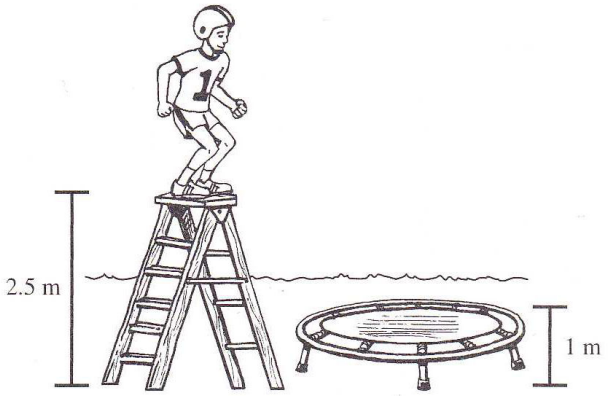
8) From the given graph of $y = f'(x)$, sketch a graph of $y = f(x)$.



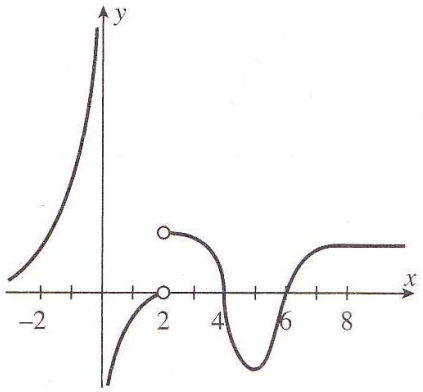
9) Dan is on a ladder, 2.5 meters tall, above a trampoline which is 1 meter off the ground. He jumps onto the trampoline which propels him 3 meters into the air before he lands on the ground. Let $f(t)$ be his height after t seconds. Sketch a graph of $f(t)$ and $f'(t)$.

a) Sketch a graph of $y = f(t)$.

b) Sketch a graph of $y = f'(t)$.



10) Where is $y = f(x)$ not differentiable?



11) Find $f'(x)$ and $f''(x)$ for $f(x) = x^3 - 2x^2 + 3$.

You can use formulas for #11 instead of using the definition of the derivative.

12) A particle moves along an axis in such a way that at time t the particle is $t^3 - 2t^2 + 3$ meters from the origin. Find the velocity and acceleration at time $t = 3$. Is the particle moving left or right? Is the particle speeding up or slowing down? Use question 11.

13) Use your best judgment to determine the graph of $y = f''(x)$ given this graph of $y = f(x)$.