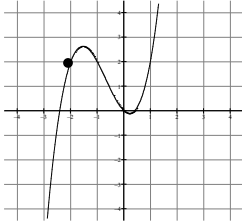


Unit 2 Review

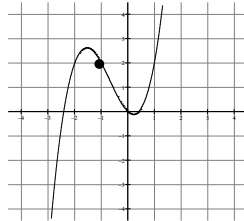
DIFFERENTIATION – Definition of Derivative and Basic Derivative Rules

Determine whether the slope of the tangent line to the curve at the indicated point is positive, negative or zero.

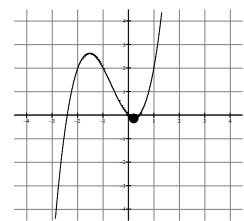
1.)



2.)



3.)



3.) If $f(2)=3$ and $f'(2)=-1$, find the equation of the tangent line when $x=2$.

4.) Find the equation of the tangent line to the graph of $f(x) = x^2 - 2x - 3$ when $x=2$.

5.) Differentiate $y = \frac{3x}{x^2 + 1}$

6.) For the function $f(t) = \frac{t^3 + 2}{t}$, find the following.

a.) the average rate of change of $f(t)$ on the interval $[1, 4]$

b.) the instantaneous rate of change of $f(t)$ when $t=2$

7.) Suppose that $h(x) = \frac{g(x)}{f(x)}$ and
 $g(2) = 3, g'(2) = -1, f(2) = 5, f'(2) = -2$.
 Find $h'(2)$.

8.) Let $f(x) = \begin{cases} ax, & x \leq 1 \\ bx^2 + x + 1, & x > 1 \end{cases}$. Find all
 possible values of a and b such that $f(x)$ is
 differentiable at $x = 1$.
 Show proper justification.

9.) If $f(x) = 2x^2 + 4$, which of the following will calculate the derivative of $f(x)$?

(A) $\frac{[2(x + \Delta x)^2 + 4] - (2x^2 + 4)}{\Delta x}$

(B) $\lim_{\Delta x \rightarrow 0} \frac{(2x^2 + 4 + \Delta x) - (2x^2 + 4)}{\Delta x}$

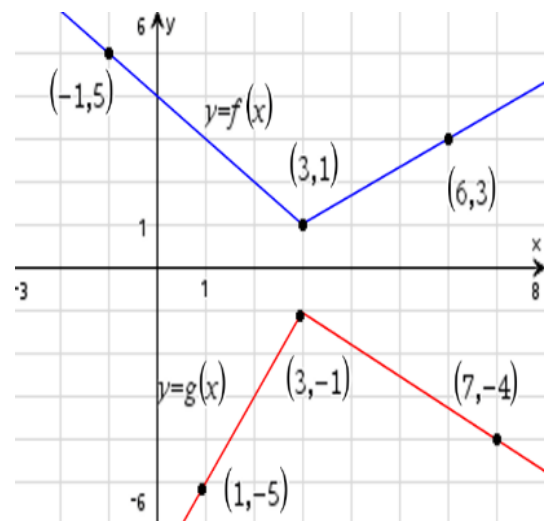
(C) $\lim_{\Delta x \rightarrow 0} \frac{[2(x + \Delta x)^2 + 4] - (2x^2 + 4)}{\Delta x}$

(D) $\frac{(2x^2 + 4 + \Delta x) - (2x^2 + 4)}{\Delta x}$

10.) Let $h(x) = f(x) \cdot g(x)$.
 Find $h'(2)$.

- (A) -2 (B) 1
 (C) 7 (D) -1

11.) What is $g'(3)$?



12.) One lazy day, Uncle Si decides to sit under a shade tree next to a road by the swamp and count the number of ducks which cross the road. The data in the table below shows the accumulation of the number of ducks crossing this road at each hour after 9:00am.

Hours after 9AM	0	1	2	3	4	5	6	7
# of ducks that have crossed the road	0	3	8	11	12	21	24	28

Find the following:

a.) Determine the average number of ducks which have crossed the road per hour during Uncle Si's 7-hour observation. Label your result.

b.) Estimate the value of $f'(4.5)$ and explain its meaning.

13.) $\lim_{\Delta x \rightarrow 0} \frac{2(-2 + \Delta x)^3 - 2(-2 + \Delta x) - 2}{\Delta x} - (-14)$ represents $f'(c)$ for a function $f(x)$ and a number c . Find $f(x)$ and c .

14.) Suppose that $f(x)$ and $g(x)$ and their derivatives have the following values at $x = -1$ and $x = 0$.

x	$f(x)$	$g(x)$	$f'(x)$	$g'(x)$
-1	0	-1	2	1
0	-1	-3	-2	4

Evaluate the first derivative of each of the following combinations of $f(x)$ and $g(x)$ at the given value of x .

a.) $3f(x) - g(x)$, $x = -1$

b.) $3f(x) \cdot g(x)$, $x = -1$

c.) $\frac{f(x)}{g(x) + 2}$, $x = 0$

15.) The graph of f' , the derivative of f_2 is shown for $-2 < x < 7$ and f' is define for all x on the interval $-2 < x < 7$. What are all values of x for which f has a horizontal tangent line on $-2 < x < 7$?

- (A) $x=0,4$ (B) $x=-1,1,6$
(C) $x=0,2,4$ (D) $x=2,3$

