1.(1 pt) If $f(x) = 19$, find $f'(10)$.

2.(1 pt) If $f(x) = 7x+27$, find $f'(5)$.

3.(1 pt) If $f(x) = 7+4x-5x^2$, find $f'(-5)$.

4.(1 pt) If $f(x) = \frac{3}{x^2}$, find $f'(4)$.

5.(1 pt) Let

$$f(x) = \sqrt{3+5x}$$

$f'(3) =$ ______

6.(1 pt) Let

$$f(x) = \frac{1}{x-3}$$

Use the limit definition of the derivative on page 156 to find
(i) $f'(0) =$ ______
(ii) $f'(2) =$ ______
(iii) $f'(5) =$ ______
(iv) $f'(7) =$ ______

To avoid calculating four separate limits, I suggest that you evaluate the derivative at the point when $x = a$. Once you have the derivative, you can just plug in those four values for "a" to get the answers.

7.(1 pt) For each of the given functions $f(x)$, find the derivative $\left(f^{-1}\right)'(c)$ at the given point c, using Theorem , first finding $a = f^{-1}(c)$.

$f(x) = 4x+9x^9; c = -13$
$a =$ ______
$\left(f^{-1}\right)'(c) =$ ______
$f(x) = x^2-8x+22$ on the interval $[4,\infty); c = 7$
$a =$ ______
$\left(f^{-1}\right)'(c) =$ ______

8.(1 pt) The position of a cat running from a dog down a dark alley is given by the values of the table.

t(seconds)	0	1	2	3	4	5
s(feet)	0	13	29	78	87	106

A. Find the average velocity tor the time period beginning when t=2 and lasting
__ 1. 3 s
__ 2. 2 s
__ 3. 1 s

B. Draw the graph of the function for yourself and estimate the instantaneous velocity when t=2

______

9.(1 pt) This problem tests calculating new functions from old ones:
From the table below calculate the quantities asked for:

x	-17	-2	10	-4	29	-3
$f(x)$	-4609	-4	1088	-46	25199	-17
$g(x)$	4915	10	-998	66	-24387	29
$f'(x)$	832	7	319	39	2580	20
$g'(x)$	-867	-12	-300	-48	-2523	-27

______ $f(-2)/(g(-2)+5)$
______ $f(f(-3))$
______ $(f/g)'(-2)$
______ If $h(x) = g(f(x))$, calculate $h'(-3)$.

10.(1 pt) Constructing new functions from old ones and calculating the derivative of the new function from the derivatives of the old functions:
From the table below calculate the quantities asked for:

x	4	-17	156	-6	-2	133
$f(x)$	156	-9231	7641348	-354	-6	4740519
$g(x)$	133	-9842	7592989	-437	-17	4705408
$f'(x)$	111	1665	146639	191	15	106665
$g'(x)$	97	1735	146017	217	25	106135

______ $(f+g)'(4)$
______ $(f/g)'(4)$
______ $(fg)'(4)$
______ $f(4)/(g(4)+5)$

11.(1 pt) This problem tests calculating new functions from old ones:
From the table below calculate the quantities asked for:

x	4	1	3	-2	15
$f(x)$	-23	4	-2	13	-2894
$g(x)$	24	3	15	0	255
$f'(x)$	-30	3	-13	-18	-613
$g'(x)$	10	4	8	-2	32

______ $(fg)(3)$
______ If $h(x)=f(g(x))$, calculate $h'(3)$
______ $f(f(3))$
______ $(f-g)'(1)$
______ If $h(x)=f(f(x))$, calculate $h'(1)$

______

12.(1 pt)

This problem tests calculating new functions from old ones:
From the table below calculate the quantities asked for:

x	4	28	-63	-134	55	-3
$f(x)$	-134	-43934	500155	4812340	-332807	55
$g(x)$	-63	-21951	250048	2406105	-166374	28
$f'(x)$	-97	-4705	-23815	-107737	-18151	-55
$g'(x)$	-48	-2352	-11907	-53868	-9075	-27

______ $(f-g)'(4)$
______ If $h(x)=g(f(x))$, calculate $h'(-3)$.
______ If $h(x)=f(g(x))$, calculate $h'(-3)$
______ $f(f(-3))$
______ $(fg)(-3)$

______

13.(1 pt)

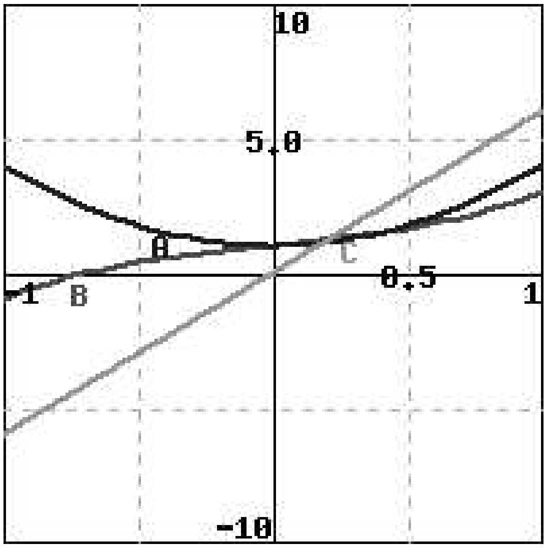
Given the following table:

x	0.0092	0.0093	0.0094	0.0095	0.0096
f(x)	0.95211808	0.6539028	-0.41793537	-0.99980391	-0.4742475

Calculate the value of $f'(0.0094)=$ ______ to two places of accuracy.
To obtain more precise information about the value of f near 0.0094 enter a new increment value for x here rule1in.01in and then press the Submit Answer button.
How will you tell when your increment is small enough to give you a good answer for the problem?

______

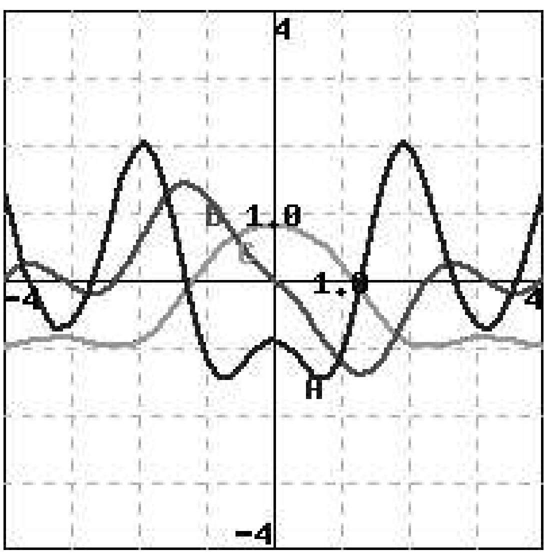
14.(1 pt)



Identify the graphs A (blue), B(red) and C (green) as the graphs of a function and its derivatives:

____________________ is the graph of the function
__________ is the graph of the function's first derivative
________ is the graph of the function's second derivative

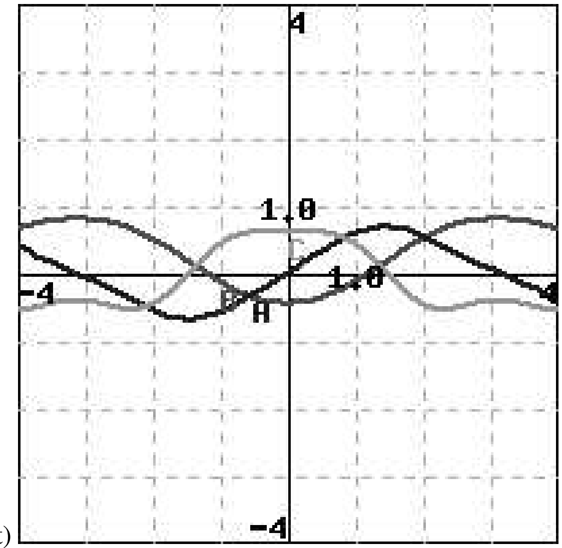
15.(1 pt)



Identify the graphs A (blue), B(red) and C (green) as the graphs of a function and its derivatives:

____________________ is the graph of the function
__________ is the graph of the function's first derivative
________ is the graph of the function's second derivative

16.(1 pt)



Identify the graphs A (blue), B(red) and C (green) as the graphs of a function and its derivatives:

____________________ is the graph of the function
__________ is the graph of the function's first derivative
________ is the graph of the function's second derivative

17.(1 pt) Let

$$f(x) = -2x^3 - 9x - 5$$

Use the limit definition of the derivative on page 163 to calculate the derivative of f:

$f'(x) =$ ______________________________ .

Use the same formula from above to calculate the derivative of this new function (i.e. the second derivative of f):

$f''(x) =$ ______________________________ .

18.(1 pt)

The oracle function $f(x)$ is presented below. For each x value you enter the oracle will tell you the value $f(x)$. Calculate the derivative of the function at -1.5 using the Newton quotient definition.

$f'(x)$ at $-1.5 =$ __________ You can use a **calculator**

x	→	f(x)
Enter x	→	result: $f(x)$
Enter x	→	result: $f(x)$
Enter x	→	result: $f(x)$

Remember the technique for finding instantaneous velocities from average velocities? This is the same thing.

19.(1 pt) Below is an "oracle" function. An oracle function is a function presented interactively. When you type in a t value, and press the –f–> button the value $f(t)$ appears in the right hand window. There are three lines, so you can calculate three different values of the function at one time.

The function f(t) represents the height in feet of a ball thrown into the air, t seconds after it has been thrown.

Calculate the average velocity 3.08 seconds after the ball has been thrown.

Average velocity at 3.08 = ____ You can use a **calculator**

The java Script calculator was displayed here

Remember this technique for finding velocities. Later we will use the same method to find the derivative of functions such as $f(t)$.

20.(1 pt) Find a and b such that the function

$$f(x) = \begin{cases} x^2 - 6x + 13 & \text{if} \quad x \le 2 \\ ax + b & \text{if} \quad x > 2 \end{cases}$$

is differentiable everywhere.

$a =$ ______

$b =$ ______

21.(1 pt) Let $f(x)$ be the function $11x^2 - 5x + 8$. Then the quotient $\frac{f(3+h)-f(3)}{h}$ can be simplified to $ah + b$ for:

$a =$ ______

and

$b =$ ______

22.(1 pt) Let $f(x)$ be the function $\frac{1}{x+7}$. Then the quotient $\frac{f(5+h)-f(5)}{h}$ can be simplified to $\frac{-1}{ah+b}$ for:

$a =$ ______

and

$b =$ ______

23.(1 pt)

Let $f(x) = x^3 - 11x$. Calculate the difference quotient $\frac{f(2+h)-f(2)}{h}$ for

$h = .1$ ______

$h = .01$ ______

$h = -.01$ ______

$h = -.1$ ______

If someone now told you that the derivative (slope of the tangent line to the graph) of $f(x)$ at $x = 2$ was an integer, what would you expect it to be? ______

24.(1 pt)

Let $f(x) = \frac{1}{x-6}$. Calculate the difference quotient $\frac{f(4+h)-f(4)}{h}$ for

$h = .1$ ______

$h = .01$ ______

$h = -.01$ ______

$h = -.1$ ______

If someone now told you that the derivative (slope of the tangent line to the graph) of $f(x)$ at $x = 4$ was $-1/n^2$ for some integer n what would you expect n to be?

$n =$ ______

25.(1 pt)

Let $f(x) = \sqrt{x+5}$. Calculate the difference quotient $\frac{f(11+h)-f(11)}{h}$ for

$h = .1$ ______

$h = .01$ ______

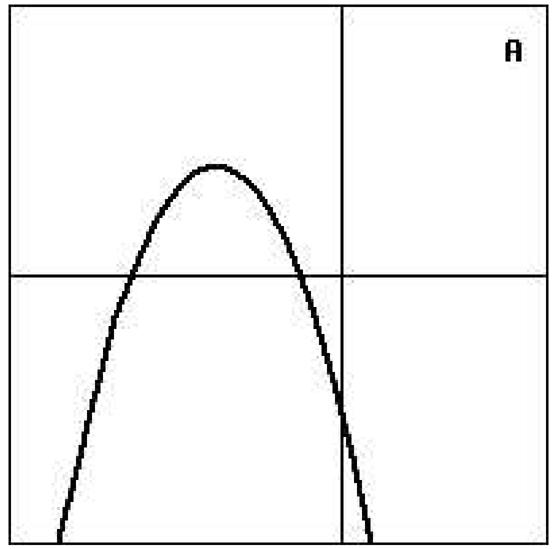
$h = -.01$ ______

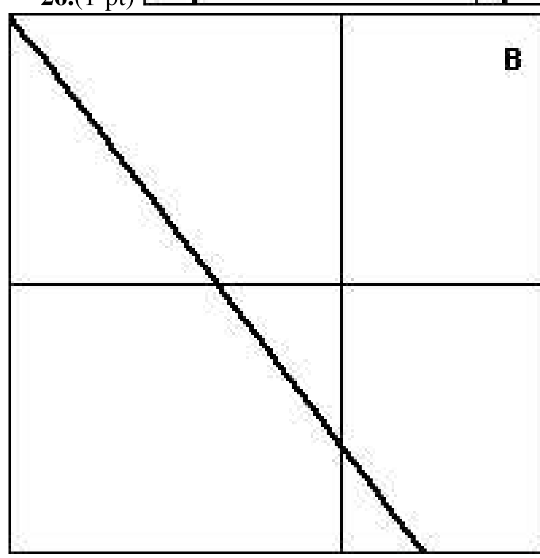
$h = -.1$ ______

If someone now told you that the derivative (slope of the tangent line to the graph) of $f(x)$ at $x = 11$ was $1/n$ for some integer n what would you expect n to be?

$n =$ ______

26.(1 pt)

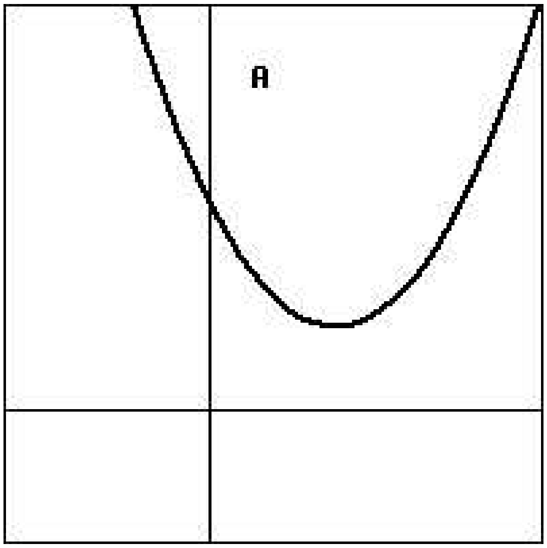


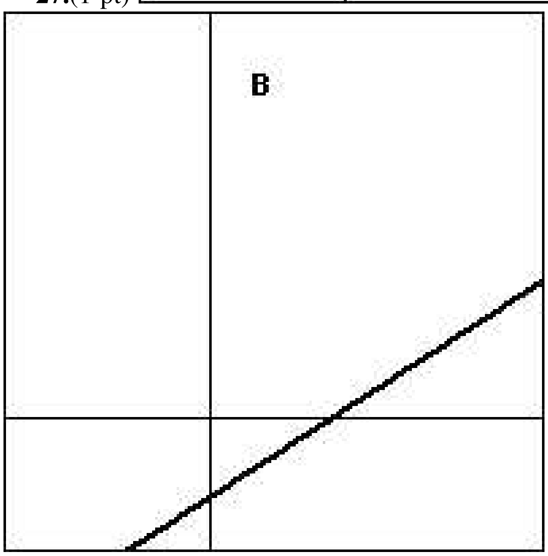


Graphs A and B are approximate graphs of f and f' for $f(x) = -x^2 - 8x - 9$.

So f is decreasing (and f' is negative) on the interval (a, ∞) for $a =$ ______ .

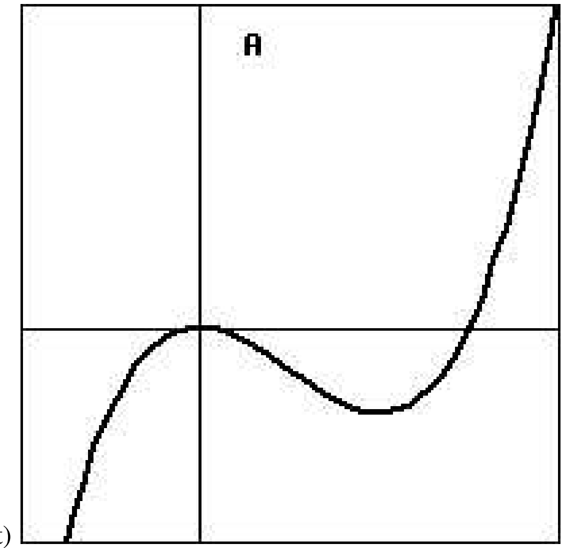
27.(1 pt)

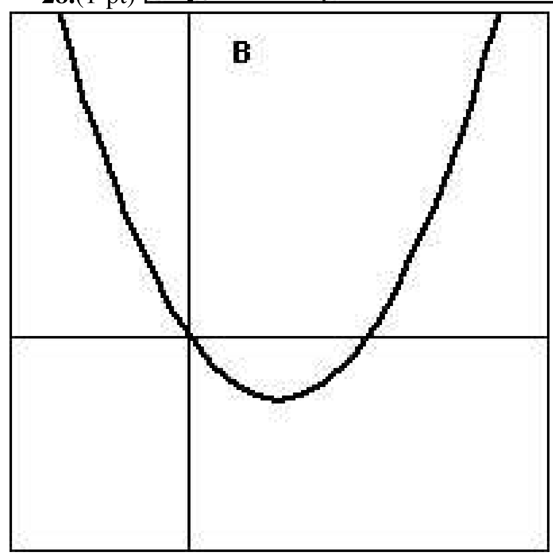




Graphs A and B are approximate graphs of f and f' for $f(x) = x^2 - 10x + 26$.
So f is increasing (and f' is positive) on the interval (a, ∞) for $a =$______ .

28.(1 pt)





Graphs A and B are approximate graphs of f and f' for $f(x) = x^2(x-9)$.
So f is decreasing (and f' is negative) on the interval $(0, a)$ for $a =$______ .