

Write your questions and thoughts here!



What are the names of the “fathers” of calculus?

What is a derivative?

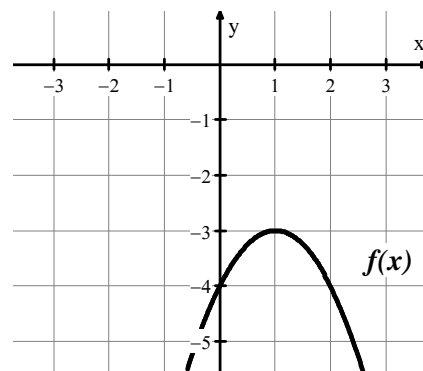
- 1.
- 2.

Definition of the Derivative

$$f'(x) =$$

Find the derivative:

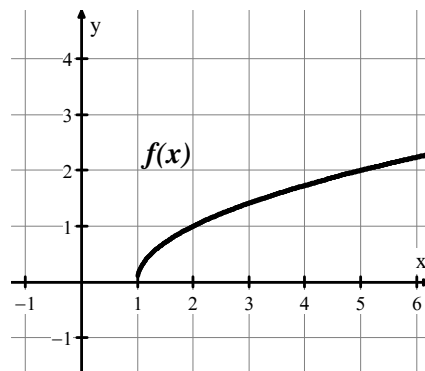
1. $f(x) = -x^2 + 2x - 4$



Find $f(1) =$ Find $f'(1) =$



2. $f(x) = \sqrt{x-1}$



Find $f(5) =$ Find $f'(5) =$

15.2 Definition of the Derivative

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Notation

Lagrange: or (f prime of x)

Leibnitz: (d y d x)

Equation of a Tangent Line

Point-Slope Form:

Slope-Intercept Form:

3. $f(3) = -1$ and $f'(3) = 4$. Find an equation of the tangent line at $x = 3$.

4. $y = -\frac{1}{9}x^3 + 2x + 10$ and $\frac{dy}{dx} = -\frac{1}{3}x^2 + 2$. Find an equation of the tangent line at $x = 3$.

Now summarize what you learned!



15.2 Practice – Definition of the Derivative

Name: _____

Pre-Calculus

Find the derivative using limits. If the equation is given as $y =$, use Leibniz Notation: $\frac{dy}{dx}$. If the equation is given as $f(x) =$, use Lagrange Notation: $f'(x)$. WRITE SMALL!!

1. $y = 5x + 1$

2. $f(x) = 7 - 6x$

3. $y = 31$

4. $y = 5x^2 - x$

5. $f(x) = 4$

6. $f(x) = 2 + 10x - x^2$

$$7. y = 3x^2 - 2x + 8$$

$$8. f(x) = \sqrt{2x - 1}$$

$$9. y = \sqrt{5x + 2}$$

$$10. f(x) = 2 - \sqrt{6x + 5}$$

$$11. f(x) = \frac{1}{3x-2}$$

$$12. y = \frac{1}{5-x}$$

For each problem, create an equation of the tangent line of f at the given point. The answer can be in point-slope form OR slope-intercept.

$$13. f(7) = 5 \text{ and } f'(7) = -2$$

$$14. f(-2) = 3 \text{ and } f'(-2) = 4$$

$$15. f(1) = -5 \text{ and } f'(1) = 3$$

16. $f(x) = 3x^2 + 2x$; $f'(x) = 6x + 2$; $x = -2$

17. $f(x) = 10\sqrt{6x+1}$; $f'(x) = \frac{30}{\sqrt{6x+1}}$; $x = 4$

18. $f(x) = \cos 2x$; $f'(x) = -2 \sin 2x$; $x = \frac{\pi}{4}$

19. $f(x) = \tan x$; $f'(x) = \sec^2 x$; $x = \frac{\pi}{3}$

Using the function listed, find the equation of the tangent line at the given x-value.

20. $f(x) = 8x - 4$; $x = 2$

21. $f(x) = 2x^2 - 5x + 1$; $x = -1$

15.2 Application / Extension

For each problem, use the information given to identify the meaning of the two equations in the context of the problem. Write in full sentences!

<p>1. f is the number of fish in a pond. x is the month of the year for the function $f(x)$. $f(6) = 781$ and $f'(6) = 102$</p>	<p>2. S is the number of students in Mr. Brust's class. x is the number of years since 2010 for the function $S(x)$. $S(3) = 127$ and $S'(3) = 4$</p>
<p>3. C is the number of championships Sully has won while coaching basketball. t is the number of years since 2002 for the function $C(t)$. $C(12) = 3$ and $C'(12) = 0.4$</p>	<p>4. d is the distance (in miles) from home when you walk to school. h is the number of hours since 7:00 a.m. for the function $d(h)$. $d(0.2) = 0.5$ and $d'(0.2) = -11$</p>
<p>5. W is the number of cartoon shows Mr. Kelly watches every week. x is the number of children Mr. Kelly has for the function $W(x)$. $W(7) = 25$ and $W'(7) = 3$</p>	

For 6-8, use the graph of f to identify each of the values.		
6. $f(7)$	7. $f(3)$	8. $\frac{f(7)-f(3)}{7-3}$
For 9-11, insert the proper inequality symbol $<$ or $>$ between the given quantities.		
9. $\frac{f(7)-f(3)}{7-3} \square \frac{f(5)-f(3)}{5-3}$	10. $f'(3) \square f'(7)$	11. $f'(3) \square f'(1)$

Skillz Review: Using the graph, find each value.

- | | |
|--------------------------------------|--------------------------------------|
| a. $\lim_{x \rightarrow 3^-} f(x) =$ | b. $f(-1) =$ |
| c. $\lim_{x \rightarrow -3} f(x) =$ | d. $\lim_{x \rightarrow -1} f(x) =$ |
| e. $f(-3) =$ | f. $\lim_{x \rightarrow 3^+} f(x) =$ |
| g. $f(3) =$ | h. $\lim_{x \rightarrow 0} f(x) =$ |

