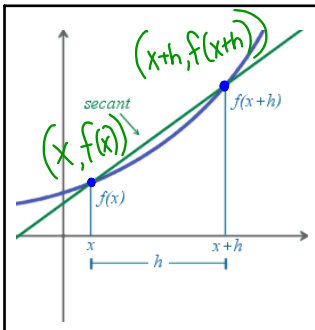
$f(x)=4x^2-5x+9$

Find $f(2)=15$
$f(-1)=18$
$f(a)=4a^2-5a+9$
$f(a+h)=4a^2+8ah+4h^2-5a-5h+9$
$f(x+h)=4x^2+8xh+4h^2-5x-5h+9$

Mar 10-9:43 PM



Slope of Secant Line =

$\frac{\text{rise}}{\text{run}} = \frac{y_1-y_2}{x_1-x_2}$

$= \frac{f(x+h)-f(x)}{x+h-x}$

$= \frac{f(x+h)-f(x)}{h}$

Mar 10-9:26 PM

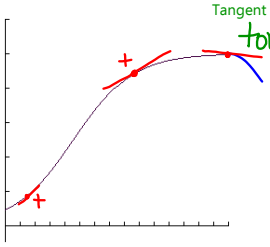
https://www.desmos.com/calculator/noidqc0wvk

Mar 8-5:35 PM

How do we draw a TANGENT line to a curve at a given point?

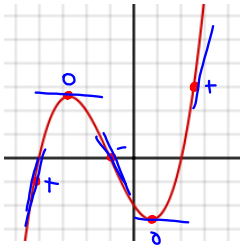
Secant {in Latin} means: Cut 2 pts

Tangent {in Latin} means: touches 1 pt



Mar 10-9:28 PM

How do we draw a TANGENT line to a curve at a given point?



Mar 10-9:32 PM

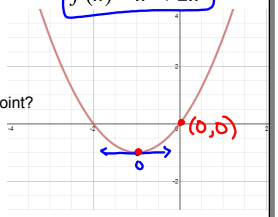
How to use ALGEBRA and CALCULUS to find the SLOPE of the TANGENT lines (WOO!)

$f(x) = x^2 + 2x$

Is the slope of this function constant? NO

Is the slope ever zero? If so, where? yes $x = -1$

How can we find a formula for the slope at any point?



$\lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$

① $f(x+h) = (x+h)^2 + 2(x+h)$

$= x^2 + 2xh + h^2 + 2x + 2h$

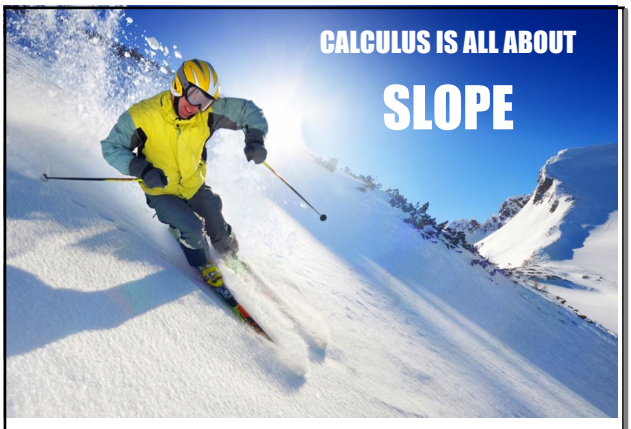
② $= x^2 + 2xh + h^2 + 2x + 2h + (-x^2 - 2x)$

③ $= \frac{2xh + h^2 + 2h}{h}$

$= 2x + h + 2$

$= 2x + 2$

Mar 10-9:33 PM



Mar 10-9:39 PM

HOMEWORK

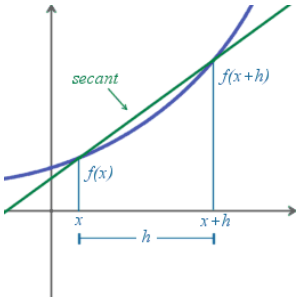
...<3 <3 <3

Tangent Worksheet {due tomorrow}

Mar 10-9:41 PM

Questions over worksheet?

Mar 10-9:43 PM



Slope of Secant Line:

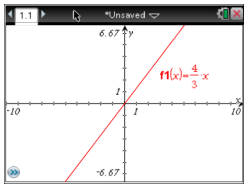
Slope of Tangent Line at x:

Mar 10-9:26 PM

Calculus is a branch of mathematics that studies the rate of change (aka slope) of a function.

What is the rate of change for the line $y = \frac{4}{3}x$

Does the rate ever change?



Mar 2-4:17 PM

THE DERIVATIVE

Mar 11-3:04 PM

Example
a. Find the general formula for the slope of f(x) = 10x - 2x²

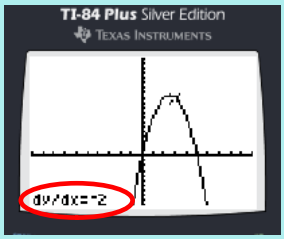
$$f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$$

b. Find the slope specifically at the point (3,12).

c. Find the equation of the tangent line at (3,12).

Mar 2-5:40 PM

Confirm equation of tangent line with the calculator.
Must still show work for full credit!



TI-84
Graph f(x).
In graph window, hit 2nd/Calc
Hit #6: dy/dx
Type in "3" (since x-coordinate was 3)
Will show

p. 808, #13 (HW)

Mar 2-5:53 PM

TI-Nspire

1) Graph f(x)

2) Go to Menu/Trace/Graph Trace & type 3 then enter to lock point onto graph. Escape out of trace mode.

3) Go to Menu/Points & Lines/Tangent. Scroll cursor to marked point on graph. Hit enter to lock tangent line on the graph. Escape out of tangent mode.

4) Go to Menu/Actions/ Coordinates & Equations. Click on tangent line and equation will display. Hit enter to lock.

Mar 11-3:07 PM

Example | p. 808, #22
Find f'(x) and f'(1).

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

p. 808, #21 (HW)

Mar 11-3:11 PM

HOMEWORK

...derivatives

11.3a (p808): 5-23 odd {19-23 - just find f '(x) and f '(1)}

Murder Mysteries...

Mar 10-9:41 PM

Questions over 11.3a?

Mar 12-4:19 PM

WARM UP

Answer the following questions on a clean sheet of paper; this will be the start of tonight's homework.

- Write the formula for f'(x).
- What does this give us in terms of the graph of f(x)?
- What do we call this new function (hint: starts with a "d")?

Mar 12-4:20 PM

Take a guess:

What would f'(x) be for...

f(x)=2x+3

f(x)= -2x+3

f(x)=4

f(x)=0.001

p. 808, #27 (HW)

Mar 12-4:22 PM

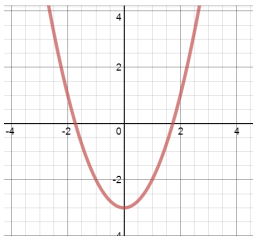
Example

Find the slope of the graph at the given point, then find an equation of the tangent line to the graph at the point. Finally, graph your results.

$f(x)=x^2-3$ at (-1,-2)

Mar 12-4:24 PM

What would the GRAPH of f'(x) {$f(x)=x^2-3$} look like? Hmmm..



x	$f'(x)$	Meaning...?

Mar 12-4:27 PM

http://www.flashandmath.com/mathlets/calc/derplot/derplot.html

http://people.hofstra.edu/stefan_waner/calctopic1/derivgraphex.html

p. 810, #71 (HW)

Mar 12-4:42 PM

HOMEWORK

...more derivatives!

11.3b (p808): 25-35 odd, 39, 40, 71-74 all

Monday: 4-question common assessment on limits

- Find a limit numerically
- Find a limit algebraically
- Find a limit graphically (piecewise)
- Find the derivative of a function

Mar 10-9:41 PM