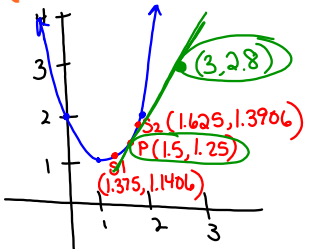
Questions over worksheet?



$P*S_1 = \frac{y-y}{x-x} = \frac{1.25-1.1406}{1.5-1.375}$

$= \frac{.1094}{.125} = .8752$

$P*S_2 = \frac{1.3906-1.25}{1.625-1.5} = \frac{.1406}{.125}$

$= 1.1248$

$h = .125$

.5, .75, .8752, 1, 1.1248, 1.25, 1.5

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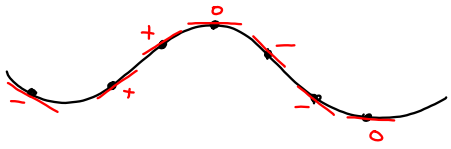

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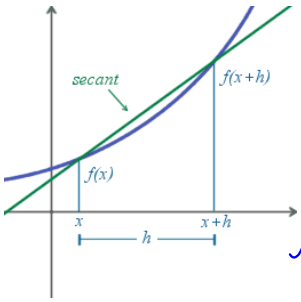

Slope of Secant Line:

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

Slope of Tangent Line at x:

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

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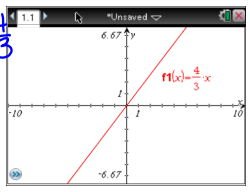
Calculus is a branch of mathematics that studies the rate of change (aka slope) of a function.

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

Does the rate ever change?



$\lim_{h \to 0} \{1.\ \frac{f(x+h)-f(x)}{h}\ 2.\ 3.$

1. $f(x+h) = \frac{4}{3}(x+h) = \frac{4}{3}x + \frac{4}{3}h - \frac{4}{3}x$

2. $\frac{\frac{4}{3}h}{h}$ $\frac{4}{3}$

Mar 2-4:17 PM

THE DERIVATIVE

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

Slope of a tangent line.

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Example

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

$f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$ $10-4x$

1. $f(x+h) = 10(x+h) - 2(x+h)^2$
2. $= 10x + 10h - 2(x^2 + 2xh + h^2)$
   $= 10x + 10h - 2x^2 - 4xh - 2h^2 - (10x - 2x^2)$
   $= 10x + 10h - 2x^2 - 4xh - 2h^2 - 10x + 2x^2$
3. $= \frac{10h - 4xh - 2h^2}{h}$

$\lim_{h \to 0} \frac{10 - 4x - 2h}{10 - 4x}$

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

$10-4(3)$ $10-12$ -2 Slope

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

$y - 12 = -2(x-3)$

$y - 12 = -2x + 6$

$+12 \quad +12$

$y = -2x + 18$

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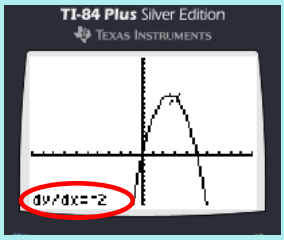
Confirm equation of tangent line with the calculator.
Must still show work for full credit!



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

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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.

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

Derivative

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

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

1. $f(x+h)=\dfrac{\left(\sqrt{x+h+3}-\sqrt{x+3}\right)}{h}\cdot\dfrac{\left(\sqrt{x+h+3}+\sqrt{x+3}\right)}{\left(\sqrt{x+h+3}+\sqrt{x+3}\right)}$
2.
3.

$x+h+3-(x+3)$

$x+h+3-x-3$

$$\frac{h}{h\left(\sqrt{x+h+3}+\sqrt{x+3}\right)}$$

$$\lim_{h\to 0}\frac{1}{\sqrt{x+h+3}+\sqrt{x+3}}=\frac{1}{2\sqrt{x+3}}=f'(x)$$

$$f'(1)=\frac{1}{2\sqrt{1+3}}=\frac{1}{4}$$

p. 808, #21 (HW)

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HOMEWORK

...derivatives

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

~~Murder Mysteries~~.

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