Questions on WKS 3-3 HW? Also we will have a quiz today on 3.1 through 3.3.

Pink HW sheets:

CHANGE 10/14/16

3.4 HW p 124-125 #25-42 all

NOT #3-45 (x3)

(12) $g(t) = \dfrac{\sqrt[3]{t^2}}{3t-5} = \dfrac{t^{2/3}}{3t-5}$

$$g'(t) = \frac{(3t-5)\left(\frac{2}{3}t^{2/3-1}\right) - \left(t^{2/3}\right)(3)}{(3t-5)^2} =$$

$$\frac{2t^{2/3} - \frac{10}{3}t^{-1/3} - 3t^{2/3}}{(3t-5)^2} = \frac{-t^{2/3} - \frac{10}{3}t^{-1/3}}{(3t-5)^2}$$

$$= \frac{\sqrt[3]{-t^2} - \frac{10}{3\sqrt[3]{t}}}{(3t-5)^2}$$

Oct 6-7:43 AM

Constant Rule : $\frac{d}{dx}[c] = 0$

Power Rule : $\frac{d}{dx}[x^n] = n \cdot x^{n-1}$

Constant Multiple Rule : $\frac{d}{dx}[c \cdot u] = c \cdot \frac{du}{dx}$

Sum and Difference Rule : $\frac{d}{dx}[u \pm v] = \frac{du}{dx} \pm \frac{dv}{dx}$

Product Rule : $\frac{d}{dx}[u \cdot v] = u \cdot \frac{dv}{dx} + v \cdot \frac{du}{dx}$

Quotient Rule : $\frac{d}{dx}\left[\frac{u}{v}\right] = \frac{v \cdot \frac{du}{dx} - u \cdot \frac{dv}{dx}}{v^2}$

From 3.3...

Second and Higher Order Derivatives

$y^{(2)}$ y' y'' y'''

The multiple-prime notation begins to lose its usefulness after three primes.

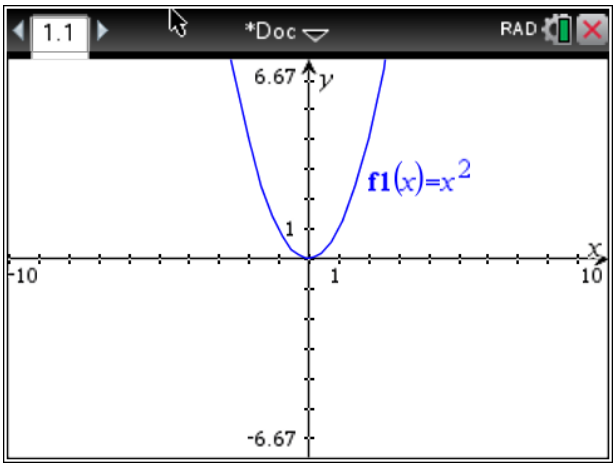
So we use $y^{(n)} = \frac{d}{dx} y^{(n-1)}$ "y super n"

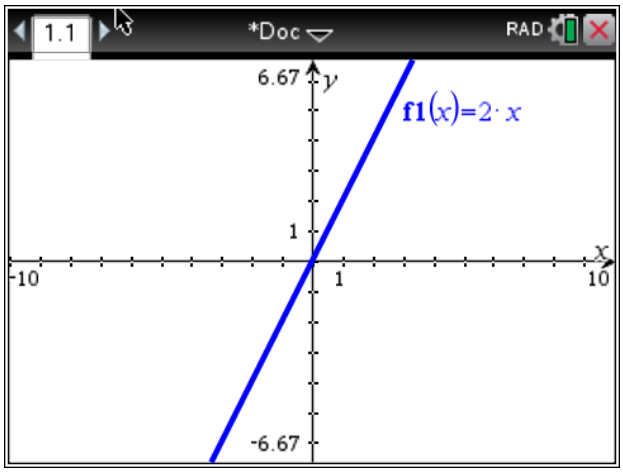
to denote the nth derivative of y with respect to x.

Do not confuse the notation $y^{(n)}$ with the nth power of y, which is y^n.

Oct 11-2:08 PM

Here's a f(x).....and its f'(x)





Comparing f(x) and f'(x)...

f(x)	f'(x)

Graph Match Activity

Oct 12-2:57 PM

3.4 Slope, tangent lines, and normals

Slope

1. Find the slope of the curve $f(x)=3x^2-2x+1$ at the point where $x=-1$.

$f'(x)=6x-2$

$f'(-1)=6(-1)-2$

$f'(-1)=-6-2$

$f'(-1)=-8$

2. Which of the following is a function with a vertical tangent at $x=0$?

(A) $f(x)=x^3$ ~~(A)~~

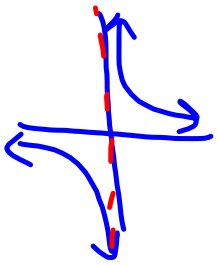
$f'(x)=3x^2$

(B) $f(x)=\sqrt[3]{x}=x^{1/3}$

$f'(x)=\frac{1}{3}x^{-2/3}=\frac{1}{3\sqrt[3]{x^2}}$

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

$f'(x)=-x^{-2}=-\frac{1}{x^2}$



3. At what value(s) of x does the curve $f(x) = 4x^3 - 4x^2 - 15x$ have a horizontal tangent?

$f'(x) = 12x^2 - 8x - 15$

Slope is 0.

$0 = 12x^2 - 8x - 15$

$0 = (12x^2 - 18x)(+10x - 15)$

$0 = 6x(2x-3) + 5(2x-3)$

$0 = (2x-3)(6x+5)$

$x = -\frac{5}{6}, \frac{3}{2}$

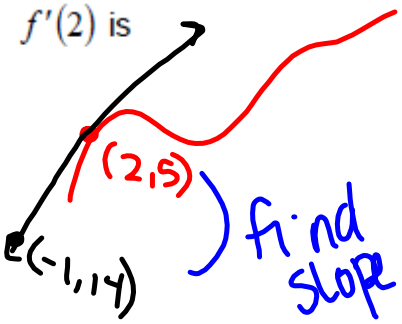
a·c = 12·-15 = -180

-18 10

-8

b

4. If the line tangent to the graph of f at the point $(2, 5)$ passes through the point $(-1, 14)$ then $f'(2)$ is



$f'(2) = \frac{14-5}{-1-2} = \frac{9}{-3} = -3$

Tangent lines

5. What is the equation of the line tangent to the graph of $y = \frac{3x+4}{x^2-2}$ at $x = 2$?

$y' = \frac{(x^2-2)(3)-(3x+4)(2x)}{(x^2-2)^2} = \frac{3x^2-6-6x^2-8x}{(x^2-2)^2} =$

$\frac{-3x^2-8x-6}{(x^2-2)^2}$

y'

$y(2) = \frac{3\cdot 2+4}{2^2-2} = \frac{10}{2} = 5$

$(2,5)$

$y'(2) = \frac{-3(2)^2-8(2)-6}{(2^2-2)^2} = \frac{-17}{2}$

$y-5 = \frac{-17}{2}(x-2)$

$y = \frac{-17}{2}x+17+5$

$y = \frac{-17}{2}x+22$

6. Let $f(x) = 4x^3 - 3x - 1$. An equation of the line tangent to $y = f(x)$ at $x = 2$ is

(A) $y = 25x - 5$

(B) $y = 45x + 65$

(C) $y = 45x - 65$

(D) $y = 65 - 45x$

(E) $y = 65x - 45$

7. What are the equations of the lines tangent to the graph of $y = x^2 + x$ at $y = 12$?

8. At what point on the graph of $y = \frac{1}{4}x^4$ is the tangent line parallel to the line $x - 8y = 16$?

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Normals

9. An equation of the normal to the graph of $f(x)=\frac{x}{2x-3}$ at $(1, f(1))$ is

(A) $3x+y=4$

(B) $3x+y=2$

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

(D) $x-3y=4$

(E) $x+3y=2$

$f'(x)=\frac{(2x-3)(1)-x(2)}{(2x-3)^2}$

$=\frac{2x-3-2x}{(2x-3)^2}=\frac{-3}{(2x-3)^2}$

$f(1)=\frac{1}{2\cdot1-3}=\frac{1}{-1}=-1$

$(1,-1)$

$f'(1)=\frac{-3}{(2\cdot1-3)^2}=\frac{-3}{(-1)^2}=\frac{-3}{1}=-3$

$m=\frac{1}{3}$ | $(1,-1)$

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

$y=\frac{1}{3}x-\frac{1}{3}-1$

$y=\frac{1}{3}x-\frac{4}{3}$

$3y=x-4$

$4=x-3y$

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Homework

3.4 pg.124-125 #25-42

Oct 21-8:47 AM