09/21/2023

Last Time: Exam I

Today: Product + Quotient Rule, 3.2

Future: Quest HW Due M
Grade Scope HW Due W
Exam II is 10/17

The Exam was hard but everything was based on

① Class ② Quest ③ Gradescope

Ex:

#2 - 08/22 Notes: write $\left(\frac{1}{3}\right)^{2x-3} = a \cdot 3^{bx}$, find a, b

Good	Bad
· Study in groups.	· Finding the pattern, not understanding the problem.
· Being the teacher	· Not using the textbook
· Getting Help at Sager LC.	· The internet should not solve our HW.
· Little math every day >	· Waiting till the last minute to review / do HW / study / ...
· Lots of math once a week.	
· Mistakes are good, before the test.	
· Quest Review	
· Go thru the Class examples	

V

My ideas:

0. Get to class early,
1. During Class:
   1. Turn on the focus setting
   2. Put it away
   3. Sit where you won't be distracted
   4. Work the problems
   5. If you don't know what to do, ASK.
2. After Class:
   1. Do math within 2 hours of class ending
   2. Do math every day
   3. Go to Discussion Section

https://en.wikipedia.org/wiki/Forgetting_curve

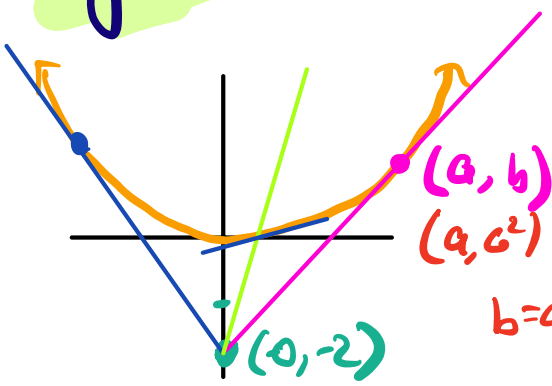
   4. When something doesn't make sense, ASK!

3. Places for extra Help:
   1. Sanger Learning Center
   2. UT Calc Lab
   3. Engineering Resources

1. Good
2. Bad but optimistic.
3. Overwhelmed. ← Course Switch

Drop 408C
Pick up 305G

Find the equation of the line tangent to $y = x^2$ that passes thru $(0,-2)$.



$y-b=m(x-a)$ OR
$y+2=m(x-0)$

* we want the derivative at a to equal the slope from (a,b) to $(0,-2)$

$y' = 2x \Rightarrow 2a$

$\frac{y_2-y_1}{x_2-x_1} = \frac{b+2}{a-0}$

$\Rightarrow 2a = \frac{b+2}{a}$

$\therefore 2a^2 = b+2$

$2a^2 = a^2+2$

$a^2 = 2$

$a = \pm\sqrt{2}$

$\Rightarrow (\sqrt{2}, 2) = (a,b)$
$(-\sqrt{2}, 2) = (a,b)$

$m = 2\sqrt{2}$ or $-2\sqrt{2}$

$y+2=2\sqrt{2}(x-0)$

$y+2=-2\sqrt{2}(x-0)$

OR

$y-2=2\sqrt{2}(x-\sqrt{2})$

$[f(x) \pm g(x)]' = f'(x) \pm g'(x)$

~~$[f(x)\cdot g(x)]' = f'(x)g'(x)$~~

$[4x^2]' = [(2x)\cdot(2x)]'$

$8x = 2\cdot 2$

~~$8x = 4$~~

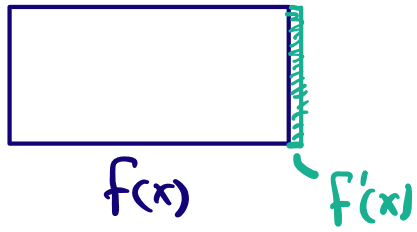
Product Rule:

$[f\cdot g]' = f'g + g'f = fg' + gf' = g'f + gf'$

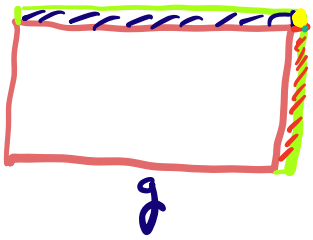
$[2x\cdot e^x]' = [2x]'e^x + 2x[e^x]' = 2e^x + 2xe^x = 2e^x(1+x)$

$[(2x)(2x)]' = [2x]'2x + 2x[2x]' = 2\cdot 2x + 2x\cdot 2 = 4x + 4x = 8x$

$[c\cdot f(x)]' = c\cdot f'(x)$



$[f(x)\cdot g(x)]'$



$gf' + g'\cdot f$

Quotient Rule: $\left[\frac{f(x)}{g(x)}\right]' = \frac{f'\cdot g - g' f}{g^2}$

$\left[\frac{x^2+5}{x+1}\right]' = \frac{[x^2+5]'(x+1) - [x+1]'(x^2+5)}{(x+1)^2} = \frac{2x(x+1)-(x^2+5)}{(x+1)^2}$

$= \frac{x^2+2x-5}{(x+1)^2}$

$\left[\frac{xe^x}{x-1}\right]' = \frac{[xe^x]'(x-1) - [x-1]'(xe^x)}{(x-1)^2} =$

$\frac{([x]'e^x + x[e^x]')(x-1) - xe^x}{(x-1)^2}$

$= \frac{(e^x + xe^x)(x-1) - xe^x}{(x-1)^2}$

$\left[\frac{x}{1+\frac{3}{x}}\right]'$

$\left[\frac{x^2+3x-4}{x-1}\right]'$

$\left[\frac{x}{\frac{x+3}{x}}\right]' = \left[\frac{x^2}{x+3}\right]'$

$\left[\frac{(x+4)(x-1)}{x-1}\right]' = [x+4]' = 1$