| GROUP NAME: | Student Names (First and Last) |
| --- | --- |
| Date:__________ | Speaker/Presenter: __________ |
| Independant Variable (x-axis):__________ | Writer/Prep:__________ |
| Dependant Variable (y-axis): __________ | Leader/Collaborator:__________ |

Conclusion (in words):

1 + 2

Supporting Work:

1. What is Calculus? Study of change

What is "the derivative"? ~~The slope of the tangent line~~ instantaneous Rate of change

What is Intermediate Value theorem? To find the ~~derivative of a function~~

Find Zeros (Continuity)

2. $f(x) = x^2 - 5x + 4$ Find the average rate of change $x=0$, $x=1$

$f(0) = (0)^2 - 5(0) + 4$, $= \frac{-4}{1} = -4$ Ave. $-4$ from (0 to 1)

$f(1) = (1)^2 - 5(1) + 4$ Instantaneous $(-1)$

$$\frac{f(0) - f(1)}{0 - 1} = \frac{4}{1} = 4$$

$$f'(x) = 2x - 5 \quad f'(-1) = -2 - 5 = -7$$

GROUP NAME:

Date: 5/8/14

Student Names (First and Last)

Speaker/Presenter: Ryan Zbozovsky

Writer/Prep:

Leader/Collaborator:

Independant Variable (x-axis):

Dependant Variable (y-axis):

Conclusion (in words):

3

Supporting Work: • USE THE EPSILON-DELTA DEFINITION OF LIMITS TO FIND DELTA GIVEN EPSILON=0.01 FOR $\lim_{x \to 2} 9x+4$.

$|f(x)-L| < \varepsilon$

$|9x+4-22| < \varepsilon$

$|9x-18| < \varepsilon$

$9|x-2| < \varepsilon$

$|x-2| < \frac{\varepsilon}{9} = \delta$

$|x-2| < \frac{0.01}{9} = \delta$

• USE THE DEFINITION OF DERIVATIVE TO FIND THE DERIVATIVE OF $F(x) = x^2-7x+4$ AT $x=1$

$f(x) = x^2-7x+4$

$f(x+h) = (x+h)^2 - 7(x+h)+4$

$f(x+h)-f(x) = [(x^2+2xh+h^2)-7x-7h+4]-(x^2-7x+4)$

$= x^2+2xh+h^2-7x-7h+4-x^2+7x-4$

$\frac{f(x+h)-f(x)}{h} = \frac{2xh+h^2-7h}{h}$

$= 2x+h-7$

$\lim_{h \to 0} 2x+h-7 \Rightarrow 2x+0-7 = 2x-7$

$f'(1) = 2(1)-7$

$= -5$

| | |
|---|---|
| GROUP NAME:<br>Date: 5/8/14 | Student Names (First and Last)<br>Speaker/Presenter: Ryan Zbojovsky<br>Writer/Prep: ______<br>Leader/Collaborator: ______ |
| Independant Variable (x-axis): ______<br>Dependant Variable (y-axis): ______ | |
| Conclusion (in words): 4 | |

Supporting Work: • FIND THE EQUATION OF THE TANGENT LINE AT THE POINT $x = 16$ FOR $y = \sqrt{x}$:

$$y = y_1 + m(x - x_1)$$

Point $(16, 4)$

$$y = x^{1/2}$$

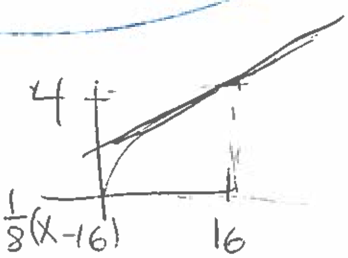
$$y' = \tfrac{1}{2} x^{1/2 - 1} = \tfrac{1}{2} x^{-1/2}$$

$$y'(16) = \tfrac{1}{2}(16)^{-1/2}$$

$$y'(16) = 1/8$$

$m_{tan}$

$$y = 4 + \frac{1}{8}(x - 16)$$




$$\sqrt{x} \approx 4 + \tfrac{1}{8}(x - 16)$$

• APPROXIMATE $\sqrt{12}$ W/O A CALCULATOR

$$y = 4 + \frac{1}{8}(12 - 16)$$

$$= 4 - \frac{1}{2}$$

$$= 3.5$$

Plug "12" in for x in above.

GROUP NAME: I ♡ SHOES

Date: 5/08/14

Student Names (First and Last)

Speaker/Presenter: Dominique C.

Writer/Prep: ____

Leader/Collaborator: ____

Independant Variable (x-axis): ____

Dependant Variable (y-axis): ____

Conclusion (in words):

5

Supporting Work:

EVALUATE LIMITS

$$\lim_{x \to a} \frac{(x-a)(x-b)}{(x-a)(x-c)}$$ ANSWER: $\frac{a-b}{a-c}$

$$\lim_{x \to \infty} \frac{\cancel{(x-a)}(x-b)}{\cancel{(x-a)}(x-c)}$$ ANSWER: 1 but how?

$$\lim_{x \to \infty} \frac{x-b}{x-c} = \frac{\infty}{\infty}$$ use LHR

$$\lim_{x \to \infty} \frac{1}{1} = 1$$

$$\lim_{x \to b} \frac{(x-a)(x-b)}{(x-a)(x-c)}$$ ANSWER: $\frac{0}{b-c} = 0$

GROUP NAME:

Date:____________

Student Names (First and Last)

Speaker/Presenter: ______________________________

Writer/Prep: ______________________________

Leader/Collaborator: ______________________________

Independant Variable (x-axis): ______________________________

Dependant Variable (y-axis): ______________________________

Conclusion (in words):

6

Supporting Work:

$$\lim_{x \to 0^-} \frac{\sin(x)}{1-\cos(x)} = \frac{0}{0} \text{ Use LHR}$$

$$\lim_{x \to 0^-} \frac{\cos x}{\sin(x)} = \frac{1}{0^-} = -\infty$$

$$\lim_{x \to 0^-} \frac{\sin(x)}{1-\cos x}$$

$$\lim_{x \to 0^-} \frac{\sin(x)}{1-\cos(x)}$$ $x = -.1, -.01,$ and $-.0$[illegible]

$$\frac{\sin(-.1)}{1-\cos(-.1)} = -19.983\ldots$$

$$\frac{\sin(-.01)}{1-\cos(-.01)} = -1[illegible]\ldots$$

$$\frac{\sin(-.001)}{1-\cos(-.001)} = [illegible]\ldots$$

Answer: $-\infty$

| | |
|---|---|
| -.1 | -19 |
| -.01 | -199 |
| -.001 | -2000 |
| 0 | $-\infty$ |

| GROUP NAME: | Student Names (First and Last) |
| --- | --- |
| Date:___________ | Speaker/Presenter: ___________ |
| Independant Variable (x-axis):___________ | Writer/Prep:___________ |
| Dependant Variable (y-axis): ___________ | Leader/Collaborator:___________ |

Conclusion (in words):

7

Supporting Work: Find the derivative of $y = x^{\cosh(x)}$

$y = x^{\cosh(x)}$

$\ln y = \ln(x^{\cosh(x)})$ log of both sides

$\frac{d}{dx}$ $\ln y = \cosh(x)\ln(x)$ ← Implicit

$\frac{1}{y}\frac{dy}{dx} = \frac{\cosh(x)}{x} + \sinh x \ln x$ ← Product Rule

$y'(x) = x^{\cosh(x)}\left(\frac{\cosh(x)}{x} + \ln(x)\sinh(x)\right)$

Other version $y' = x^{\tan x}\left(\frac{\tan(x)}{x} + \ln(x)\cdot\sec^2(x)\right)$

GROUP NAME:

Date:__________

Student Names (First and Last)

Speaker/Presenter: __________

Writer/Prep: __________

Leader/Collaborator: __________

Independant Variable (x-axis): __________

Dependant Variable (y-axis): __________

Conclusion (in words):

8

Supporting Work:

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

Evaluate the derivatives

Quotient Rule

$$y'(x) = \frac{(x+1)\sec^2(x) - \tan(x)}{(x+1)^2}$$

$$y = e^{\tan^{-1}(x)}$$

$$\frac{d}{dx}\left(\tan^{-1}(x)\right) = \frac{1}{x^2+1}$$

$$y' = e^{\tan^{-1}(x)} \cdot \frac{1}{x^2+1}$$

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

GROUP NAME:

Date:____________

Student Names (First and Last)

Speaker/Presenter: ____________

Writer/Prep: Lindy

Leader/Collaborator: ____________

Independant Variable (x-axis): ____________

Dependant Variable (y-axis): ____________

Conclusion (in words):
I love math!

9

Supporting Work:

Spherical shaped balloon filling @ 17cc per sec. How fast is radius growing when it reaches 8cm?

$$17 \, cc/sec = dV/dt$$

$$r = 8$$

$$V = \frac{4}{3}\pi r^3$$

$$\frac{dV}{dt} = \frac{4}{\cancel{3}}\pi \cdot \cancel{3} r^2 \frac{dr}{dt}$$

$$17 = \frac{4}{\cancel{3}}\pi \cdot \cancel{3} \cdot (8)^2 \frac{dr}{dt}$$

$$\frac{17}{4\pi(64)} = \frac{dr}{dt}$$

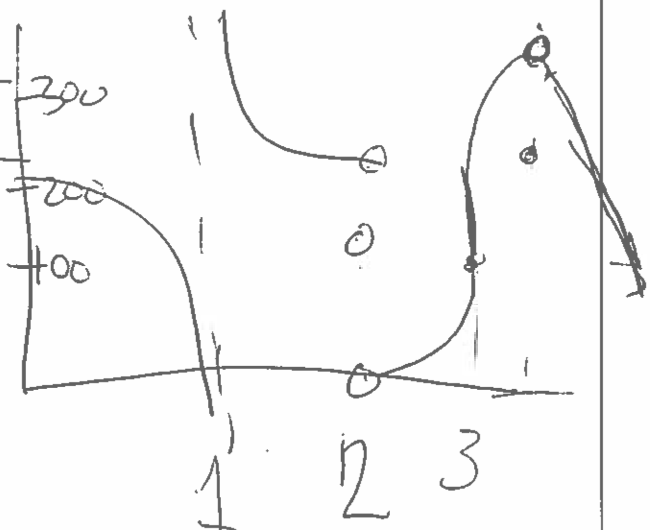
| GROUP NAME: | Student Names (First and Last) |
|---|---|
| Date:__________ | Speaker/Presenter: Kevin [illegible] |
| Independant Variable (x-axis):__________ | Writer/Prep:__________ |
| Dependant Variable (y-axis): __________ | Leader/Collaborator:__________ |

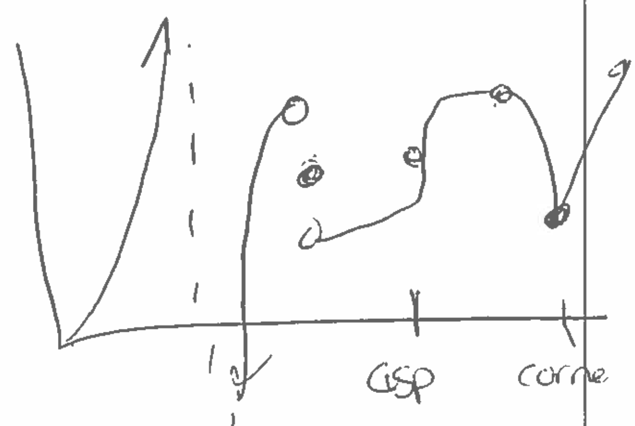
Conclusion (in words):

10 - 13

Supporting Work:

| | 1 | 2 | 3 | 4 | 5 | ∞ | |
|---|---|---|---|---|---|---|---|
| 10) | No | No | Yes | No | Yes | Yes | 300 |
| Cont | No | No | No | No | Yes | Yes | 200 |
| | 200 | 200 | 100 | 300 | 200 | -∞ | 100 |
| Diff | VA | Jump discontinuity | Csp | Hole | curve | | |



GROUP NAME:

Date:___________

Student Names (First and Last)

Speaker/Presenter: ______________________

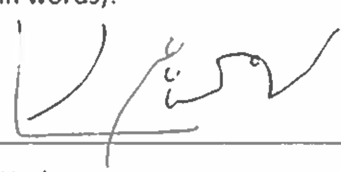
Writer/Prep: ______________________

Leader/Collaborator: ______________________

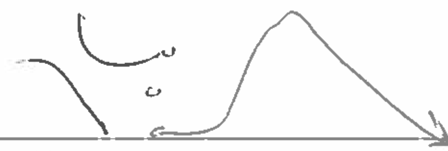
Independant Variable (x-axis): ______________________

Dependant Variable (y-axis): ______________________

Conclusion (in words):



14



Supporting Work:

When is the function concave up?

$(0,1) \cup (2,3)$ or $(1,2) \cup (2,3)$

Where is an inflection point?

3 or 3

What are the extrema?

Min 5 or NONE

When is the function decreasing and concave down?

$(4,5)$ $(0,1) \cup (4,5)$

| | |
|---|---|
| GROUP NAME: I ♡ SHOES<br>Date: 5/08/14 | Student Names (First and Last)<br>Speaker/Presenter: DOMINIQUE C. |
| Independant Variable (x-axis): ______<br>Dependant Variable (y-axis): ______ | Writer/Prep: ______<br>Leader/Collaborator: ______ |

Conclusion (in words):

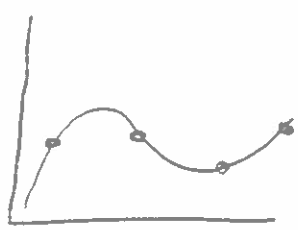
15

Supporting Work:

Given data, find a CUBIC REGRESSION

$$y = ax^3 + bx^2 + cx + d$$

$$y = 2.9166667x^3 - 41.25x^2 + 175.8\bar{3}x - 190$$



| DAY(x) | Time(Y) |
|---|---|
| 2 | 20 |
| 4 | 40 |
| 6 | 10 |
| 8 | 70 |

* NEWTON'S METHOD

$-2 \xrightarrow{STO} X$ <ENTER>

$X - Y_1 / \text{INDERIV}(Y_1, X, X) \rightarrow X$

ITERATION: -2
ITERATION: -.057649
ITERATION: 1.051175
ZEROS: -.05764968

| GROUP NAME: | Student Names (First and Last) |
|---|---|
| Date:___________ | Speaker/Presenter: ___________ |
| Independant Variable (x-axis):___________ | Writer/Prep:___________ |
| Dependant Variable (y-axis): ___________ | Leader/Collaborator:___________ |

Conclusion (in words):

16

Supporting Work:

Max of E if $E = MC^2$ and

$M + 2C = 2000$

CONSTRAINT

OPTIMIZATION

$M = 2000 - 2C$

$E(M,C) = MC^2$

$E(C) = (2000 - 2C)C^2$

$= 2000C^2 - 2C^3$

$E' = 4000C - 6C^2 = 0$

$\cancel{C}(4000 - 6C) = 0$

$C \neq 0$

$C = \frac{4000}{6} = 666\frac{2}{3}$

$E'' = 4000 - 12C$

$4000 - 12(666.) < 0$

Concave Down = Max

$E(666)$

$(2000 - 2(666))(666)^2$

$= \#$ is max