

GROUP NAME:

Date: 5/8/14

Student Names (First and Last)

Speaker/Presenter: DaniellaWriter/Prep: DaniellaLeader/Collaborator: Daniella

Independent Variable (x-axis): _____

Dependant Variable (y-axis): _____

Conclusion (in words):

#1 midterm

Supporting Work:

What is Calculus?

★ "The study of change"

What does "the derivative" mean in words?

★ The instantaneous rate of change

What can you use the Intermediate Value Theorem to do?

★ Find something between
two points like zeros of
Function/Polynomials

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Independent Variable (x-axis): _____

Writer/Prep: Jenn

Dependent Variable (y-axis): _____

Leader/Collaborator: _____

Conclusion (in words):

midterm #2

Supporting Work:

$f(x) = x^2 - 5x + 4$ find average rate of change over the interval $x=0$ to $x=1$

$$\boxed{y=} x^2 - 5x + 4$$

$$f(0) = 0^2 - 5(0) + 4 = 4$$

$$f(1) = 1 - 5 + 4 = 0$$

$$\boxed{\text{and}} \boxed{\text{trace}} \text{ 1: value } x=0 \quad 4$$

$$\boxed{\text{and}} \boxed{\text{trace}} \text{ 1: value } x=1 \quad 0$$

$$\frac{\Delta y}{\Delta x} = \frac{4-0}{0-1} = \frac{4}{-1} = -4 \leftarrow \text{average rate of change}$$

find instantaneous rate of change at $x=2$

$$\boxed{\text{and}} \boxed{\text{trace}} \text{ 6 } dy/dx \quad x=2$$

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

$$f'(x) = 2x - 5$$

$$f'(2) = 2(2) - 5 = -1$$

$-1 \leftarrow$ instantaneous rate of change

$$\text{nderv}(x^2 - 5x + 4, x, 2)$$

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Conclusion (in words):

Jason #3

Supporting Work:

3. Use the definition of derivative to find the derivative of $f(x) = x^2 - 7x + 4$ at $x = 1$

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

$$\lim_{h \rightarrow 0} \frac{(x+h)^2 - 7(x+h) + 4 - (x^2 - 7x + 4)}{h}$$

$$\lim_{h \rightarrow 0} \frac{x^2 + 2xh + h^2 - 7x - 7h + 4 - x^2 + 7x - 4}{h}$$

$$\lim_{h \rightarrow 0} \frac{2xh + h^2 - 7h}{h}$$

$$\lim_{h \rightarrow 0} \frac{h(2x + h - 7)}{h}$$

$$\lim_{h \rightarrow 0} 2x + h - 7$$

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

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

$$= -5$$

Use the epsilon-delta definition of limits to find delta given epsilon = .01 for $\lim_{x \rightarrow 2} 9x + 4$

$$\lim_{x \rightarrow 2} 9x + 4 = 22$$

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

$$|9x - 18| < \epsilon$$

$$9|x - 2| < \epsilon$$

$$|x - 2| < \epsilon / 9 = \delta$$

$$|x - 2| < \frac{.01}{9} = \delta$$

$$\delta = .001$$

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Leader/Collaborator: _____

Conclusion (in words):

#4

A) Eqn of Tan Line
at $x=16$. for $y=\sqrt{x}$

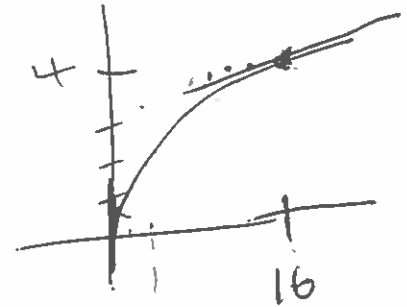
Supporting Work:

B) $T_{12} = ?$

$$y = \sqrt{x}$$

$$m_{\text{tan}} = y' = \frac{1}{2}x^{-1/2}$$

$$m_{\text{tan}} = y'(16) = \frac{1}{2}16^{-1/2} = \frac{1}{8}$$



$$\text{At } x = 16 \quad y = \sqrt{16} = 4 \quad (16, 4)$$

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

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

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

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

$$-\frac{1}{2} + 4 \approx 3\frac{1}{2}$$

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Independent Variable (x-axis): _____

Dependant Variable (y-axis): _____

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Conclusion (in words):

#4

Kathleen

Supporting Work:

(4) Find eqⁿ of tangent line at the point $x = 16$ for $y = \sqrt{x}$

$$\text{At } x = 16, y = \sqrt{16} = 4$$

$$y = mx + b$$

$$\text{At } (16, 4): 4 = m(16) + b$$

$$4 = \frac{1}{8}(16) + b$$

$$b = 2$$

Approximate $\sqrt{12}$ w/o a calculator

$$y = \frac{1}{8}x + 2$$

$$y = \sqrt{x} \approx \frac{1}{8}x + 2$$

$$\sqrt{12} = \frac{1}{8}(12) + 2 = 3\frac{1}{2}$$

$$\frac{y_2 - y_1}{x_2 - x_1} = \frac{4 - 0}{16 - 0} = \frac{1}{4}$$

$$m = \frac{1}{4} \quad m_{\tan} = \frac{dy}{dx} = \frac{d}{dx} \sqrt{x} = \frac{1}{2} x^{-\frac{1}{2}} = \frac{1}{2\sqrt{x}}$$

$$\therefore \text{eqn. } y = \frac{1}{2\sqrt{x}}$$

$$m(16) = \frac{1}{2\sqrt{16}} = \frac{1}{8}$$

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Leader/Collaborator: _____

Conclusion (in words):

Supporting Work:

Evaluate the limits. Assume a, b, c are distinct real #'s

$$\lim_{x \rightarrow a} \frac{(x-a)(x-b)}{(x-a)(x-c)}$$

Just plug a in for x

$$\frac{x-b}{x-c}$$

$$\frac{a-b}{a-c} = \#$$

$$\lim_{x \rightarrow b} \frac{(x-a)(x-b)}{(x-a)(x-c)}$$

Just plug b in for x

$$\frac{b-b}{b-c} = 0$$

$$\lim_{x \rightarrow \infty} \frac{(x-a)(x-b)}{(x-a)(x-c)}$$

Plug in ∞ for x

$$= \lim_{x \rightarrow \infty} \frac{x^2 - bx - ax + ab}{x^2 - ax - cx + ac} \Rightarrow \lim_{x \rightarrow \infty} \frac{2x - b - a}{2x - a - c}$$

$$\frac{\infty - b}{\infty - c} = \frac{\infty}{\infty} \text{ Use L'Hopital}$$

$$\Rightarrow \lim_{x \rightarrow \infty} \frac{2}{2} = 1$$

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Leader/Collaborator: _____

Conclusion (in words):

Cat

Supporting Work:

6

(a)

$$\lim_{x \rightarrow 0} \frac{\sin(x)}{1 - \cos(x)} = \frac{0}{0} \text{ v/o calculator}$$

Use L'Hôpital

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

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



(b) $\lim_{x \rightarrow 0^-} \frac{\sin(x)}{1 - \cos(x)}$ by evaluating at $x = -1, -0.1, \text{ and } -0.001$

x	Y
-1	-1.53
-0.01	-100
-0.001	-1000

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

Table shows that as we get closer to zero the Y values become more negative.

GROUP NAME: Kung Fu PandaStudent Names (First and Last): Bruce Lee

Date: _____

Speaker/Presenter: Jackie Chan

Independent Variable (x-axis): _____

Writer/Prep: _____

Dependant Variable (y-axis): _____

Leader/Collaborator: _____

Conclusion (in words): $\tan(x)$ 8:) $y = \frac{\tan(x)}{x+1}$ Use Quotient Rule!!!!!!

Supporting Work:

$$\begin{aligned}
 & \frac{g(x)f'(x) - f(x)g'(x)}{g(x)^2} \quad \text{low d high - high d low} \\
 & \quad \text{low}^2 \\
 & = \frac{(x+1)(\sec^2 x) - (\tan x)(1)}{(x+1)^2} \\
 & = \frac{\sec^2 x (x+1) - \tan(x)}{(x+1)^2}
 \end{aligned}$$

GROUP NAME: Math Group I	Student Names (First and Last) Ahmed Al-Sk
Date: _____	Speaker/Presenter: _____
Independent Variable (x-axis): _____	Writer/Prep: _____
Dependant Variable (y-axis): _____	Leader/Collaborator: _____

Conclusion (in words):

Question ~~8b~~ ~~8b~~ 8b)

Supporting Work:

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

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

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

Chain Rule

GROUP NAME:

Date:

Student Names (First and Last):

Speaker/Presenter:

Writer/Prep:

Leader/Collaborator:

Independent Variable (x-axis):

Dependent Variable (y-axis):

Conclusion (in words):

#7

Supporting Work:

Find Derivative of $y = x^{\cosh(x)}$

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

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

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

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

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

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

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Leader/Collaborator: _____

Conclusion (in words):

Supporting Work:

#9



$$\frac{dV}{dt} = 17 \text{ cc/sec}$$

$$r = 8$$

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

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

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

$$\frac{17}{4 \pi 8^2} = \frac{dr}{dt}$$

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Writer/Prep: Courtney & Tyler

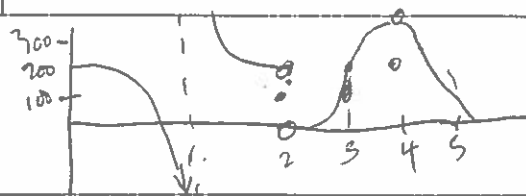
Leader/Collaborator: _____

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Conclusion (in words):

#10-13



Supporting Work:

	$x=1$	$x=2$	$x=3$	4	5	∞
continuous?	no	no	yes	no	yes	yes
Differentiable?	no	no	no	no	-200	-200
Limit from left	$-\infty$	200	100	300	200	$-\infty$
Shape	vert. asy.	jump discont.	cusp	hole	decreasing line	decreasing line

GROUP NAME: Gang Nam style

Date: 5/8/2014.

Student Names (First and Last) Jungyu Lim

Speaker/Presenter: _____

Writer/Prep: Jungyu

Leader/Collaborator: _____

Independent Variable (x-axis): _____

Dependant Variable (y-axis): _____

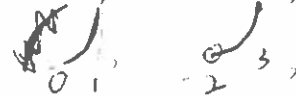
Conclusion (in words):

#14

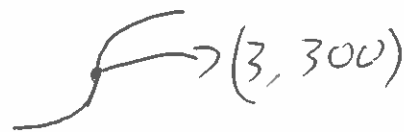
Supporting Work:

When is the function concave up?

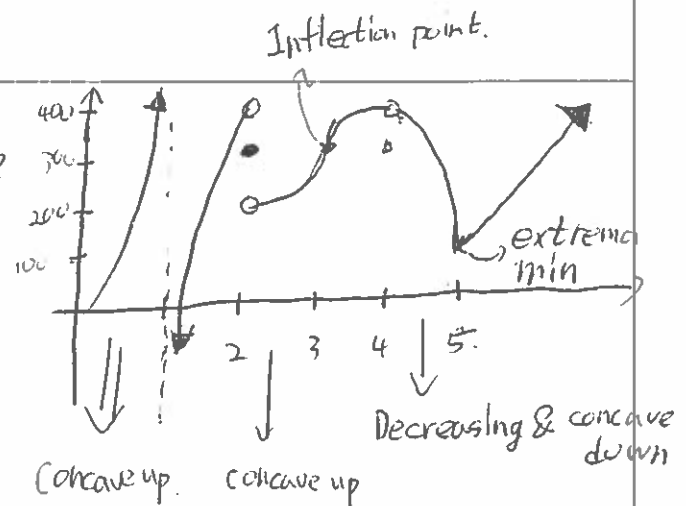
$(0, 1) \cup (2, 3)$



Where is an inflection point?



2 3 4



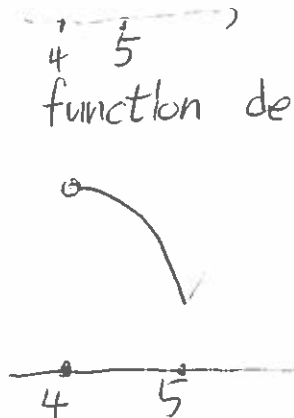
Where are the extrema?

only $(5, 100)$

$$f'(5) = 0$$

When is the function decreasing and concave down?

$(4, 5)$



GROUP NAME: _____

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Speaker/Presenter: _____

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Writer/Prep: _____

Dependant Variable (y-axis): _____

Leader/Collaborator: _____

Conclusion (in words):

Supporting Work:

 $\rightarrow \rightarrow x$ enter
 $x - y_1 / \text{nd} \text{eniv}(y_1, x, x) \rightarrow x$
 \downarrow
y-vars-Function $-y_1$

Iterations

-0.05764

1.05127

1.63554553
 $y_1 = \text{Cubic}$
 $\text{Reg} \text{ress}$
 $\approx 2.91 \times 10^3$
 $+ \dots$
 etc.

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Leader/Collaborator: _____

Conclusion (in words):

#16

Optimization / constraint

Supporting Work:

Find
Max

$$E = MC^2$$

$$\text{Given } M + 2C = 2000$$

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

$$M = 2000 - 2C$$

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

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

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

$$C = 0 \quad 4000 - 6C = 0$$

$$6C = 4000$$

$$C = \frac{4000}{6} = \frac{2000}{3} = 666\frac{2}{3}$$

$$E'' = 4000 - 12C$$

$$E''(666) = 4000 - 12(666) < 0$$

(concave Down = MAX)