Will Arbito
Ryan Zhao

3/22/10

1. What is Calculus?
The study of change. Functions are changing.
How is it used?
To see the change in revenue, average rate of change, chemistry

Yves Masoule

Abraham Egpen

THE GROUP

(6) $g(t) = t^2 - 5t + 5$

$g(0) = (0)^2 - 5(0) + 5 = 5$

$g(2) = (2)^2 - 5(2) + 5 = -1$

$$\frac{-1-5}{2-0} = \frac{-6}{2} = -3$$

$g'(t) = 2t - 5$

$g'(1) = 2(1) - 5 = -3$

TEAM: C.A.M.

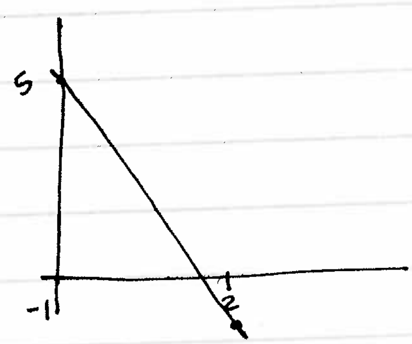
Mid-term Review
#3

INTERMIDIATE VALUE
THEOREM

$s(t) = t^2 - 5t + 5$ $t=0$; $t=2$

$s(0) = 5$ (+ Sign)

$s(2) = -1$ (- sign)



$s(t) = t^2 - 5t + 5$ is CONTINUOUS

CASANDRA LUCERO
Augustin Ciocotisan
(MAYA) MANDUKHAI KHOSBAYAR

Science Buddies

4:- Find y' if $y = \frac{\cos(3x^2+7)}{x}$

$$y' = \frac{gf' - fg'}{g^2}$$

$$y' = \frac{x \cdot \frac{d}{dx}\left[\cos(3x^2+7)\right] - \cos(3x^2+7) \cdot x'}{x^2} \qquad \boxed{x' = 1}$$

use $\boxed{\text{Chain Rule}}$

$$y' = \frac{x \cdot -\sin(3x^2+7)\, \frac{d}{dx}(3x^2+7) - \cos(3x^2+7)}{x^2}$$

$$y' = \frac{-6x\sin(3x^2+7) - \cos(3x^2+7)}{x^2} = \text{Answer}$$

* first use Quotient Rule then Chain Rule to solve it!

Quotient Rule $y' = \frac{gf' - fg'}{g^2}$

Chain Rule $y' = f'(g(x)) \cdot g'(x)$

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MAT151...

Midterm PreTest : # 5

5.) find y' if $y = e^{2x} \sin^{-1}(\ln x)$

$$\frac{d}{dx}(y) = \frac{d}{dx}\left[e^{2x} \sin^{-1}(\ln x)\right]$$

$$f'(x) = e^{2x} \frac{d}{dx}\left(\sin^{-1}(\ln x)\right) + \frac{d}{dx}(e^{2x}) \sin^{-1}(\ln x)$$

$$= e^{2x}\left(1/\sqrt{1-(\ln x)^2}\right)\frac{d}{dx}(\ln x) + e^{2x}\frac{d}{dx}(2x) \sin^{-1}(\ln x)$$

$$\boxed{= e^{2x}\left(1/x\sqrt{1-(\ln x)^2}\right) + 2e^{2x} \sin^{-1}(\ln x)}$$

Mike Gankhuyag

Jonathan Chen

LWV
Lerice
Wiggens
Viviene

3/22/10

Midterm Practice

6. Use Log Differentiation to find y' if $y = x^{\tan x}$

① $\ln y = \ln x^{\tan x}$

② $\ln y = \tan x \ln x$

③ $\ln y = \frac{1}{y} \cdot \frac{dy}{dx} = \tan x \cdot \frac{d}{dx} \ln x + \ln x \cdot \frac{d}{dx} \tan x$

④ $\tan x \frac{1}{x} + \ln x \sec^2 x$

⑤ $y' = y \; \frac{\tan x}{x} + \ln x \sec^2 x$

⑥ $y' = x^{\tan}\left(\frac{\tan x}{x} + \ln x \sec^2 x \right.$

Laquan Drummer
Sai Jahagirdar
Fabian Best

EMPIRE

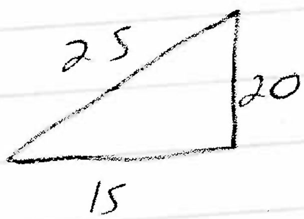
$$x^2+y^2=z^2$$

$$2x\left(\frac{dx}{dt}\right)+2y\left(\frac{dy}{dt}\right)=2z\frac{dz}{dt}$$

$$2(15)(0)+2(20)\left(10\frac{ft}{s}\right)=2(25)\frac{dz}{dt}$$

$$\frac{400}{50}=\frac{dz}{dt}$$

$8\frac{ft}{s}$



$$15^2+20^2=\sqrt{625}$$
$$=25$$

GROUP PROB #8

CIVARC

J. KOHLHEPP
R. D'SOUZA
S. MONCE

#8: APPROXIMATE THE $\sqrt{70}$ USING DIFFERENTIALS

$f(x) = x^{1/2}$, $x = 8$, $dx = 6$

$\sqrt{70} \approx \sqrt{64} + \frac{1}{2\sqrt{64}}(6)$

$\sqrt{70} \approx 8 + \frac{1}{16}(6)$

$\sqrt{70} \approx 8 + \frac{3}{8}$

ANSWER: $\sqrt{70} \approx 8\frac{3}{8}$

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

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

$f'(64) = \frac{1}{2}\sqrt{64}$

Diesel

Connor Payne Stanley Tuchez Tyler Ferst

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

$$\begin{aligned} f(a+h) &= 4(a+h)^2 - 7 \\ &= 4(a+h)(a+h) - 7 \\ &= 4(a^2 + 2ah + h^2) - 7 \\ &= \cancel{4a^2} + 8ah + 4h^2 \cancel{-7} \\ & \cancel{4a^2} \qquad\qquad\qquad \cancel{-7} \end{aligned}$$

$$\frac{f(a+h) - f(a)}{h} = \frac{8ah + 4h^2}{h} = 8a + 4h$$

$$\lim_{h \to 0} \quad 8a + 4h$$
$$8a + 4(0)$$
$$= 8a$$

Definition of Derivative

We Love Math

Krystina
Stephania
Jessica

#10

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

$4(1)^2 - 7$

$4 - 7$

-3 $\quad (1, -3)$

$\frac{d}{dx}(4x^2 - 7) = 2(4)x = 8x$

$f'(x) = 8x$

$8(1) = 8$

$y + 3 = 8(x - 1)$

Vinh
Mike
Ioan

FR3CH

#11: Find $\lim_{x \to \infty} \dfrac{\sin(x^{\tan x})}{x}$

$-1 \le \sin(x^{\tan x}) \le 1$ with whatever x is

$-\dfrac{1}{x} \le \dfrac{\sin(x^{\tan x})}{x} \le \dfrac{1}{x}$ (divide all side by x)

$\lim_{x \to \infty} \left(-\dfrac{1}{x}\right) \le \lim_{x \to \infty} \dfrac{\sin(x^{\tan x})}{x} \le \lim_{x \to \infty} \dfrac{1}{x}$

Because $\lim_{x \to \infty} \left(-\dfrac{1}{x}\right) = 0$ and $\lim_{x \to \infty} \dfrac{1}{x} = 0$

Thus : $0 \le \lim_{x \to \infty} \dfrac{\sin(x^{\tan x})}{x} \le 0$

So :

$$\lim_{x \to \infty} \frac{\sin(x^{\tan x})}{x} = 0$$

Grundle Pumpkins

12. $\lim_{x\to\infty} x^2 e^{-3x} = \lim_{x\to\infty} \frac{x^2}{e^{3x}}$

Differentiate top and bottom: $\lim_{x\to\infty} \frac{\frac{d}{dx}(x^2)}{\frac{d}{dx}(e^{3x})} = \lim_{x\to\infty} \frac{2x}{e^{3x} \bullet \frac{d}{dx}(3x)} = \lim_{x\to\infty} \frac{2x}{3e^{3x}} = \frac{2}{3} \lim_{x\to\infty} \frac{x}{e^{3x}}$

Differentiate top and bottom: $\frac{2}{3} \lim_{x\to\infty} \frac{\frac{d}{dx}(x)}{\frac{d}{dx}(e^{3x})} = \frac{2}{3} \lim_{x\to\infty} \frac{1}{e^{3x} \bullet \frac{d}{dx}(3x)} = \frac{2}{3} \lim_{x\to\infty} \frac{1}{e^{3x} \bullet 3}$

$$= \frac{2}{9} \lim_{x\to\infty} \frac{1}{e^{3x}} = \frac{2}{9} \lim_{x\to\infty} \frac{1}{\infty} = \frac{2}{9} * 0 = 0$$

Sam Tobia

Pablo Espichan

Tiejun Wen

Save The Polar Bears

13. $\lim\limits_{x \to \infty} \dfrac{3x^2 + x - 7}{x^2 + 2x + 4}$ $\qquad \lim\limits_{x \to \infty} \dfrac{\dfrac{3x^2}{x^2} + \underbrace{\dfrac{x}{x^2}}_{\to 0} - \underbrace{\dfrac{7}{x^2}}_{\to 0}}{\dfrac{1x^2}{x^2} + \underbrace{\dfrac{2x}{x^2}}_{\to 0} + \underbrace{\dfrac{4}{x^2}}_{\to 0}}$

$$\frac{3x^2}{x^2} = \frac{3}{1} = \boxed{3}$$

Melva Avila
Jalisha Crews

Team Kickass

#14 use the δ-ε definition of limits to show that $\lim_{x \to 2} (2x-3) = 1$

$$|f(x) - L| < \varepsilon$$
$$|(2x-3) - 1| < \varepsilon$$
$$|2x-3-1| < \varepsilon$$
$$|2x-4| < \varepsilon$$
$$\frac{2|x-2|}{2} < \frac{\varepsilon}{2}$$
$$|x-2| < \frac{\varepsilon}{2}$$
$$\boxed{\delta < \frac{\varepsilon}{2}}$$

Pythagorus

15 error in L = $\pm .5$ error in width = $\pm .05$

Error in Area = ?

$A = L \cdot W$

error $dA = Ldw + wdL$

$dA = 3(\pm 0.05) + 8(\pm 0.5)$

$dA = \pm .15 \pm 4.0$

$dA = .15 + 4 = 4.15$

$.15 - 4 = -3.85$

$-.15 - 4 = -4.15$

$-.15 + 4 = 3.85$

$\therefore dA = \pm 4.15$