$r(x)$ = regression

Day 3

$$\lim_{x \to a} r(x) = r(a)$$

---

linear	$r_1(x)$
quadratic	$r_2(x)$
cubic	$r_3(x)$
quartic	$r_4(x)$
exp.	$r_e(x)$
ln	$r_{\ln}(x)$

$$\lim_{x \to a^+} r_i(x) = \#$$

$$\lim_{x \to a^-} r_2(x) = \#$$

$$\lim_{x \to \infty} r_1(x) = \infty$$

$$\lim_{x \to \infty} r_2(x) = \infty$$

$r_{Logistic}(x)$ = World Pop

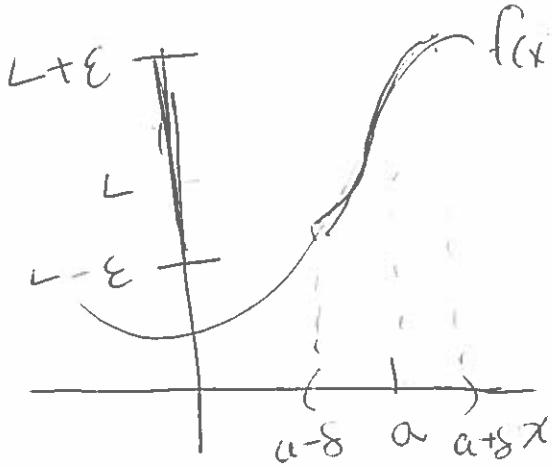
$$\lim_{x \to \infty} r_{Logistic}(x) = 22.55 \text{ billion}$$

$$\lim_{x \to -\infty} r_{Logistic}(x) = 0 \text{ billion}$$

$$\lim_{x \to \infty} r_2(x) = \infty$$

Formal Definition / ε-δ definition of Limit

$$\lim_{x \to a} f(x) = L$$



Given $\varepsilon > 0$ you can find a $\delta > 0$ so that

$|x - a| < \delta$ then

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

Ex $\lim_{x \to 2} 3x - 5 = 1$ $\varepsilon = .05$

$\lim_{x \to \boxed{2}} \underbrace{|3x-5|}_{f(x)} = \underbrace{\boxed{1}}_{L}$ Find δ

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

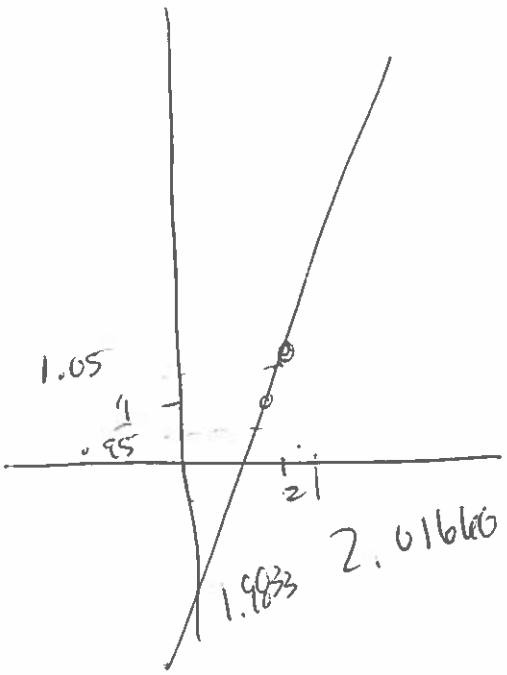
$|3x - 5 - 1| < .05$

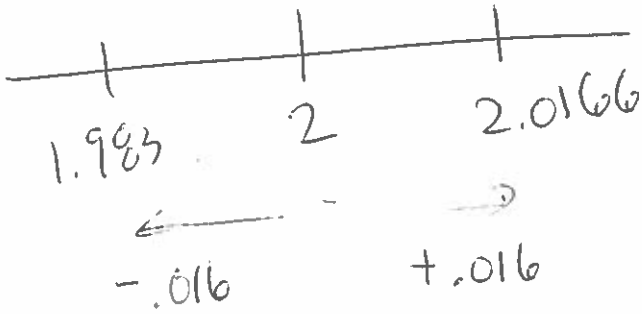
$|3x - 6| < .05$

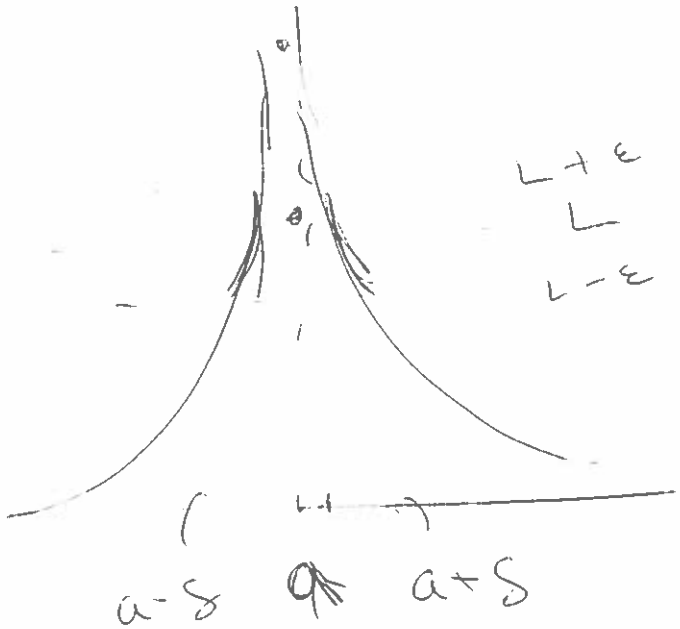
$3|x - 2| < .05$

$|x - 2| < \frac{.05}{3}$

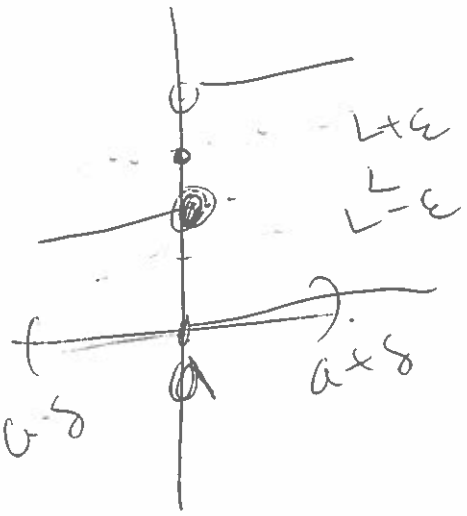
$|x - a| < \delta$



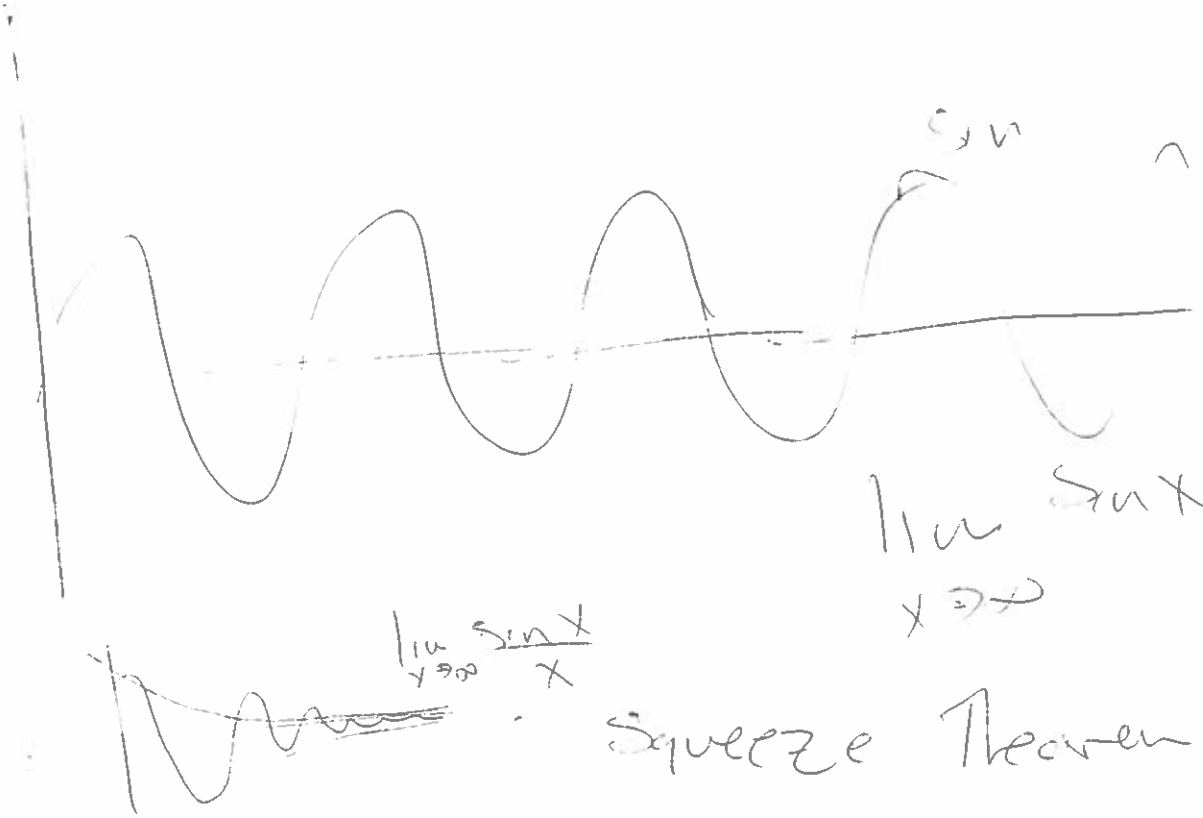




Vertical Asymtote



Jump Discontinuity



$\lim_{x \to \infty} \sin x$ DNE

$\lim_{x \to \infty} \frac{\sin x}{x}$

Squeeze Theorem

$$\lim_{x \to \infty} \frac{\sin x}{x}$$

$$-\frac{1}{x} \leq \frac{\sin x}{x} \leq \frac{1}{x}$$

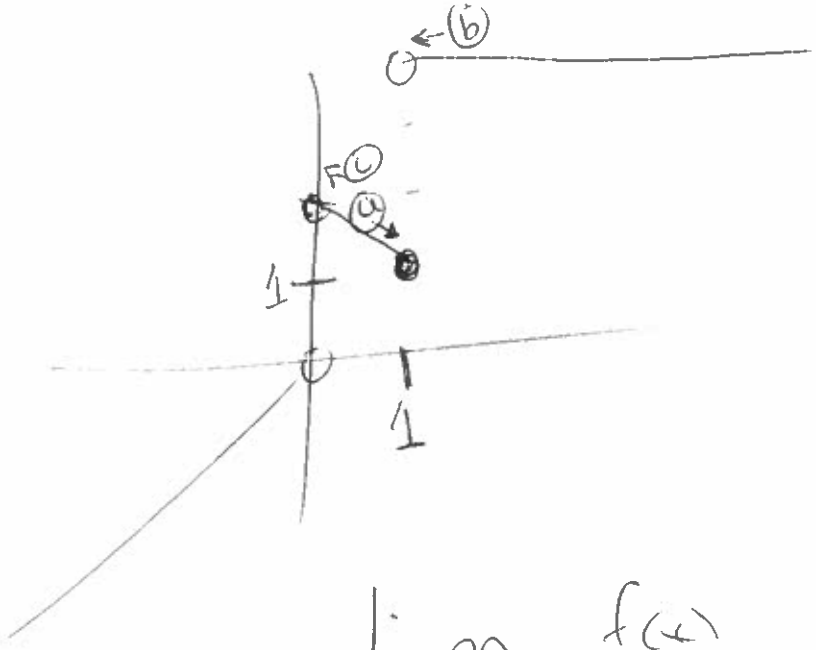
Squeeze Theorem

$$\lim_{x \to \infty} -\frac{1}{x} \leq \lim_{x \to \infty} \left(\frac{\sin x}{x} \right) \leq \lim_{x \to \infty} \frac{1}{x}$$

$$\downarrow \qquad \qquad \downarrow$$

$$0 \leq \lim_{x \to \infty} \frac{\sin x}{x} \leq 0$$

$$f(x) = \begin{cases} x & x < 0 \\ 2 - x & 0 \le x \le 1 \\ 4 & x > 1 \end{cases}$$



(a) $\lim_{x \to 1^-} f(x) = 1$

(b) $\lim_{x \to 1^+} f(x) = 4$

(c) $\lim_{x \to 0^+} f(x) = 2$

GROUP NAME: Minions

Date: 11/30/14

Student Names (First and Last)

Speaker/Presenter: Dallon/Jason

Writer/Prep: Jenn

Leader/Collaborator: Daniella/Kero

Independant Variable (x-axis): year

Dependant Variable (y-axis): international

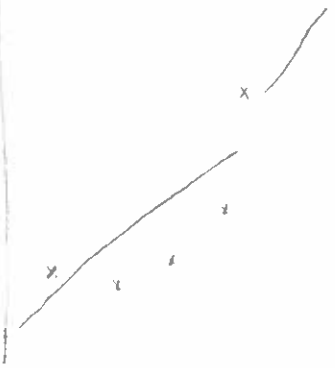
Conclusion (in words):

As time approaches 2nd from the left-hand side is [illegible] and from the right hand side, 3500 7

Supporting Work:

L1 L2

year	international
10	[illegible]
11	[illegible]
12	[illegible]
13	[illegible]
14	[illegible]



$\lim_{x \to 4^-} r_1(x) = 3464$

$\lim_{x \to 14^+} r_2(x) = 3500\ 7$

$\lim_{x \to \infty} r_2(x) = \infty$

$\lim_{x \to [illegible]} r_e(x) = 0$

GROUP NAME:

Date:

Student Names (First and Last)

Speaker/Presenter: Mike Chukes

Writer/Prep:

Leader/Collaborator: Kathleen Hernandez

Independant Variable (x-axis):

Dependant Variable (y-axis):

Conclusion (in words):

Supporting Work:

	second level
2002	122
2003	100
2006	143
2009	
2011	

$\lim_{x \to -\infty} f_3(x) = \infty$

GROUP NAME: [illegible]

Date: 1/30/14

Student Names (First and Last)

Speaker/Presenter: Milton/Annie

Writer/Prep: Courtney

Leader/Collaborator: Tyler / June

Independant Variable (x-axis): [illegible]

Dependant Variable (y-axis): [illegible]

Conclusion (in words):

As your [illegible] approaches 13%.

As your [illegible] approaches OK a year the [illegible] crime [illegible]

Supporting Work:

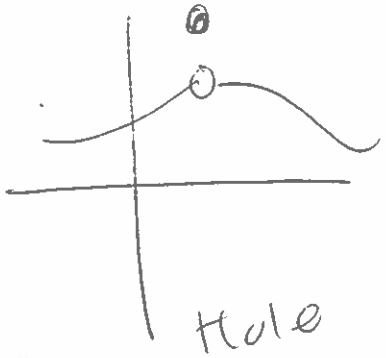
$\lim_{x \to 70^-} r_2(x) = .13343$

$\lim_{x \to 70^-} r_2(x) = .868$

Continuity

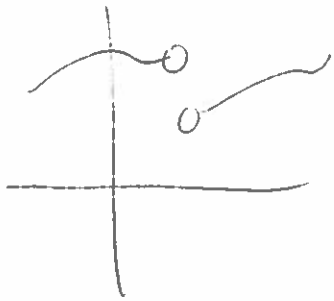
discontinuities

Asymptote

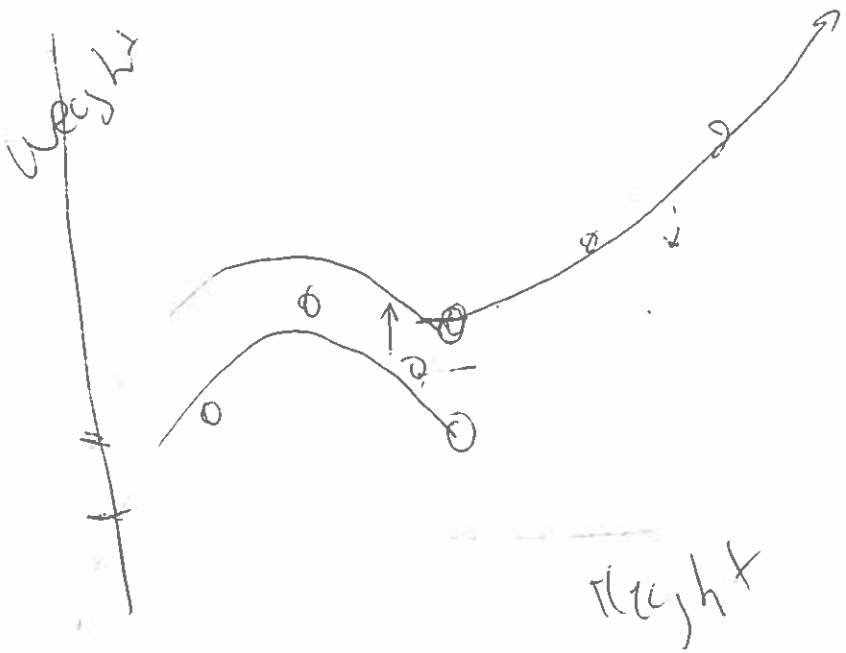


Hole

"Removable discontinuity"



Jump discontinuity



3 Conditions at a point (a)

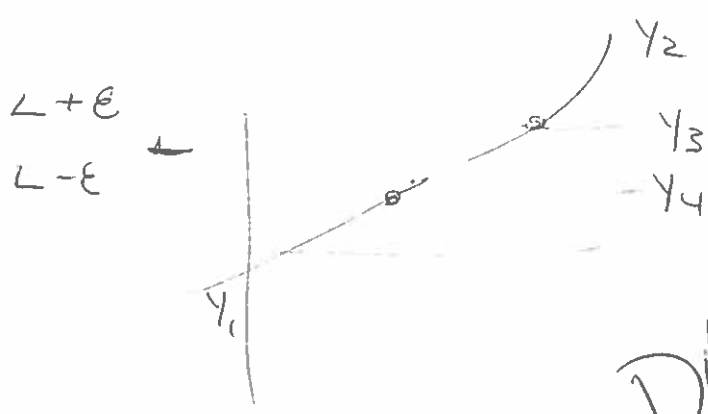
1. limit Exists $\lim_{x \to a^+} f(x) = \lim_{x \to a^-} f(x)$
2. Function Exists $f(a)$
3. $\lim_{x \to a} f(x) = f(a)$

$Y_1 =$

$Y_2 =$

$Y_3 =$

$Y_4 = 384$



DAY 4

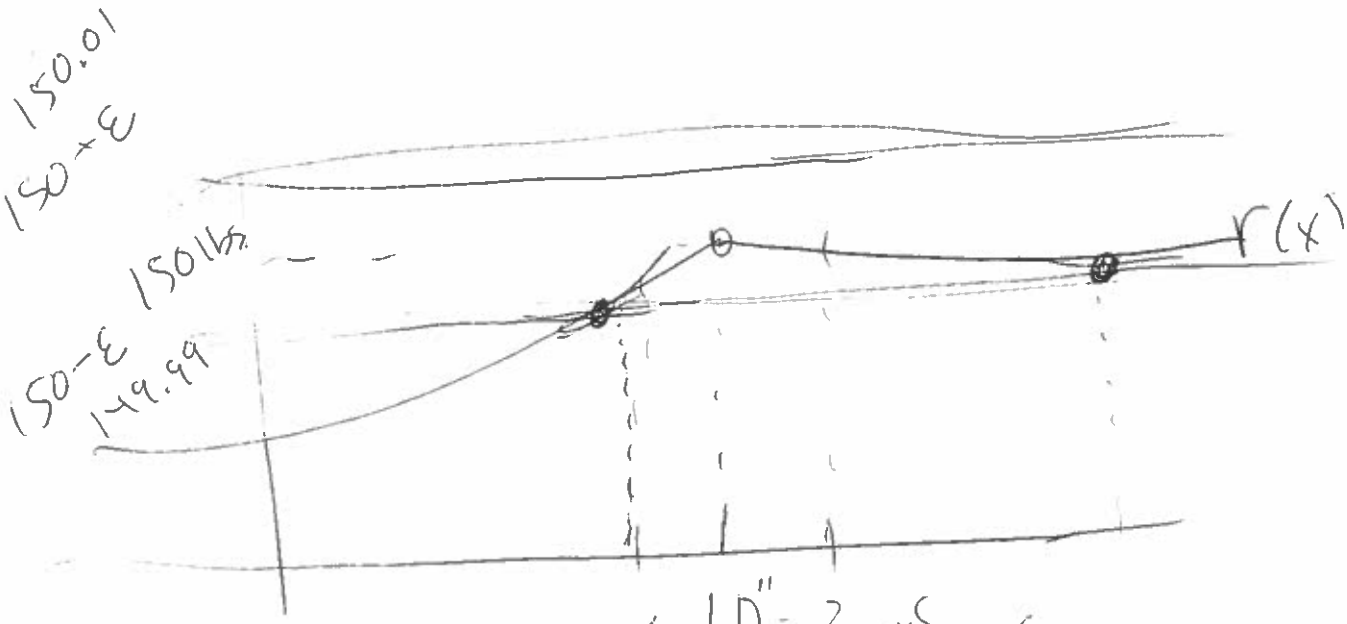
Calc 5: Intersect

1st Curve: Y_1

2nd Curve: Y_4

Guess 14

$X = 13.9999$ $Y = 384$



$$\lim_{n \to 60"} r(n) = 150 \text{ lbs}$$

$$|r(n) - 150| < \varepsilon$$

$$\downarrow$$

Find $|n - 60| < \delta$

$$\varepsilon = .01$$

δ = smaller (δ_1 or δ_2)

Winds if Weight is between 59.9 and 60

Limits

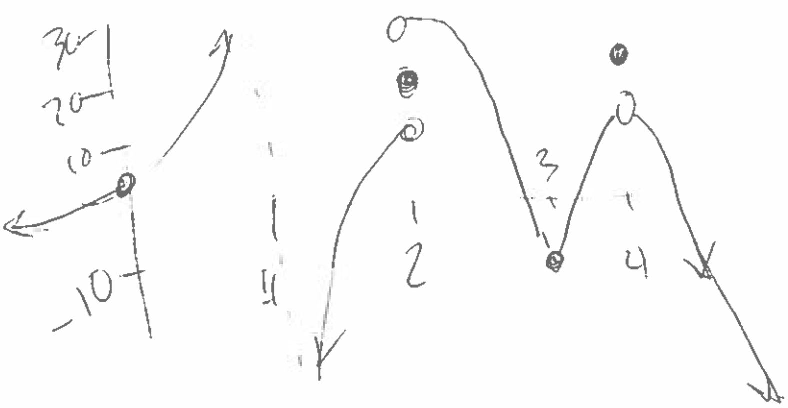
Table/Data

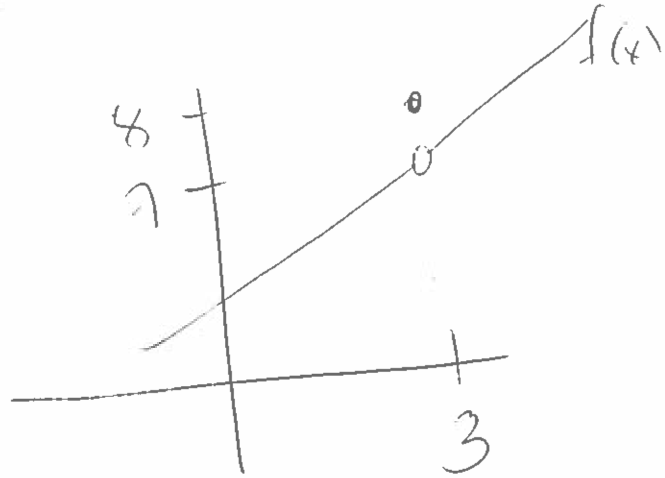
X	2.9	2.99	3	3.01	3.1
Y	7	8	□	10	11

↑ 9

$\lim_{x \to 3} y(x) = 9$

Graph

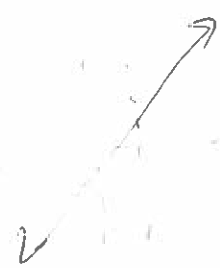




$\lim_{x \to 3} f(x) = 7$

Equation

$\lim_{x \to 2} \frac{x^2 - 4}{x - 2}$



[illegible] x

Ex

$$\lim_{x\to\infty} \frac{x^2+2x-7}{3x^2-12x+8}$$

known:

$$\lim_{x\to\infty} \frac{A}{x^n} =$$

$$\downarrow$$

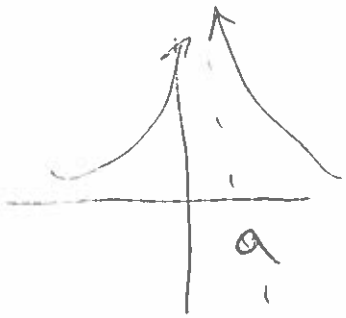
divid by x^2

$$\lim_{x\to\infty} \frac{1+\frac{2}{x}-\frac{7}{x^2}}{3-\frac{12}{x}+\frac{8}{x^2}}$$

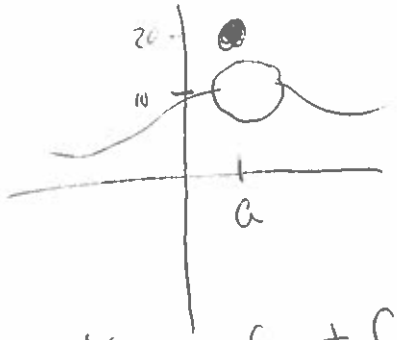
$$\lim_{x\to\infty} 1 + \lim_{x\to\infty} \frac{2}{x} - \lim_{x\to\infty} \frac{7}{x^2}$$

$$\lim_{x\to\infty} 3 + \quad , \quad -$$

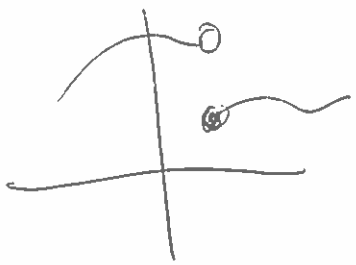
$$= \frac{1}{3}$$



Fails: $f(a)$ No Exist



Fails $\lim_{x \to a} f(x) \neq f(a)$



Fails $\lim_{x \to a} f(x)$ DNE

EVERYWHERE ELSE IS CONTINUOUS

Polys ✓ Exp ✓ Sin/Cos ✓

$\sqrt{x}$ $x \geq 0$ yes. (1 sided continuous)

$\ln x$ $x > 0$ yes

Piecewise $f(x) = \begin{cases} Ax+3 & x > 0 \\ x^2 - 7 & x \leq 0 \end{cases}$

$\lim_{x \to 0^-} f(x) = -7$

$\lim_{x \to 0^+} f(x) = 3$

Not cont. at $x = 0$

GROUP NAME: Wind Health Organization

Date: 2/4/14

Student Names (First and Last)

Speaker/Presenter: Michael Vehrk, Charles

Writer/Prep: Jenna Graziale

Leader/Collaborator: Catherine, Kathleen

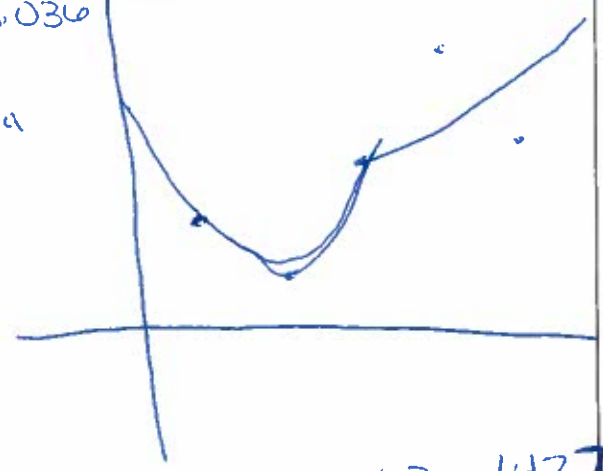
Independant Variable (x-axis): time (years)

Dependant Variable (y-axis): steriod levels (ppm)

Conclusion (in words):
Within the years 2005.9999 and 2006.001 as x approaches the last day and hour of Dec. 2005 the steroid level in food in babies = $145.024 ppm. the first hour on Jan 1st 2006 the steroid level in food in babies is $145.036

Supporting Work:

years.	steroid level in Food in Babies
2000	122
2003	100
2006	143
2009	200
2012	170



afterwards the y_1 = 145.02782 0859 & y_2 are the exact same,

Year 2006

Cubic = y_1 = 147.29

Exp = y_2 = 142.77

147.2863 - 142.7741

147.29 - 142.77

= 4.52

4.258479141

÷ 2

= 2.258479

Epsilon = 145.024
145.036

E = 0.006 (above & below our limit)

Intersection 1

X = 2005.9999 Y = 145.024

Intersection 2

X = 2006.001 Y = 145.036

GROUP NAME: Porter's M[illegible]

Date: 2/4/[illegible]

Independant Variable (x-axis): [illegible]

Dependant Variable (y-axis): [illegible]

Student Names (First and Last)

Speaker/Presenter: Jason

Writer/Prep: Jenn

Leader/Collaborator: [illegible] Kora

Conclusion (in words): As the limit approaches 14 the cost reaches 3482.79 dollars

As long as the year between 13.99998 and 14.000006 the [illegible] [illegible] [illegible] [illegible] 3482.[illegible] and 3482.[illegible]

Supporting Work:

L1	L2
10	3300
11	3300
12	3325
13	3[illegible]
[illegible]	35[illegible]

$y_1(14) - y_2(14)$

-35.836

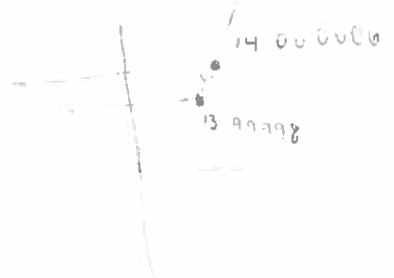
-17.918

$y = 2[illegible] * 1.04 ^x / (x [illegible]) + 5[illegible].83) / 2$

$y_2 = 17.857x^2 + [illegible] x + 5300$ — $(x \geq 1[illegible] - 35[illegible])$ [illegible]

$y_3 = 3482.7917$

$y_4 = 3482.[illegible]$



[illegible]

[illegible]

[illegible]

GROUP NAME: Fluffy Ponies

Date: 11-2-17

Student Names (First and Last)

Speaker/Presenter: Mikayla / Jose

Writer/Prep: Courtney

Independant Variable (x-axis):

Dependant Variable (y-axis):

Leader/Collaborator: Tyler / Andres

Conclusion (in words):

The [illegible] of .11404 by .001 is .80161 [illegible] is equal

Supporting Work:

	u_1	u_2
60	.13343	.13265

$u_1(60) - u_2(60) = -.11922\ldots \div 2 = -.05961021$

$u_1(60) - u_2(60) = -4.0 \times 10^{-1}$

$u_1(60) = 5 \times 10^{-1}$

.19304

$u_1(60) = .19304$ $u_2(60) = .11304$

$\varepsilon = .01$

$\frac{1}{60}$

(5) and (7)

$\rightarrow \delta$

12.2

ε