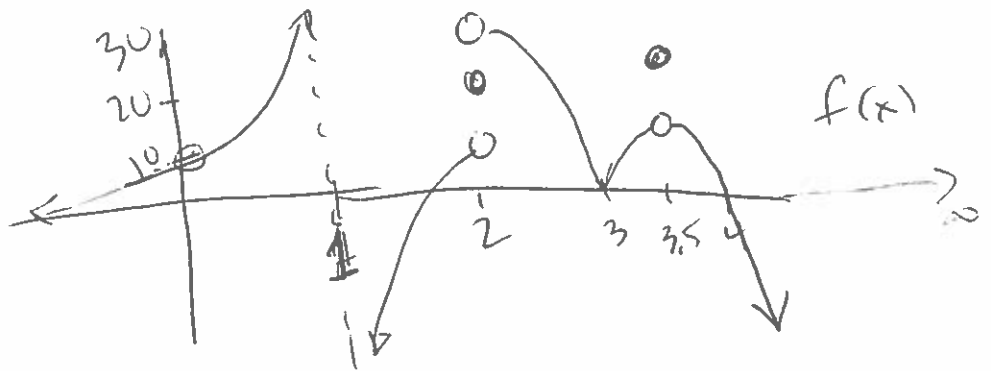


# Evaluate Limit

Data

2.9	2.99	3	3.01	3.1
7	8	9	10	11

Graph



$$\lim_{x \rightarrow 1} f(x) = \text{DNE}$$

$$\lim_{x \rightarrow 1^-} f(x) = \infty$$

$$\lim_{x \rightarrow 2^+} f(x) = 30$$

$$\lim_{x \rightarrow 3.5} f(x) = 10$$

$$\lim_{x \rightarrow -\infty} f(x) = 0$$

$$\lim_{x \rightarrow \infty^+} f(x) = \text{DNE}$$

Equation

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

1. Plug in
2. Factor Then Plug in
3. Squeeze Theorem
4. END Behavior

Ex  $\lim_{x \rightarrow \infty} \frac{x^2 - 12x + 7}{2x^2 + 5} = \frac{1}{2}$

~~lim~~ Divide everything by  $x^2$

$$\lim_{x \rightarrow \infty} \frac{1 - \frac{12}{x} + \frac{7}{x^2}}{2 + \frac{5}{x^2}}$$

$$\lim_{x \rightarrow \infty} 1 - \lim_{x \rightarrow \infty} \frac{12}{x} + \lim_{x \rightarrow \infty} \frac{7}{x^2}$$

$$\lim_{x \rightarrow \infty} 2 + \lim_{x \rightarrow \infty} \frac{5}{x^2}$$

$$\frac{1}{2}$$

# Squeeze Theorem

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

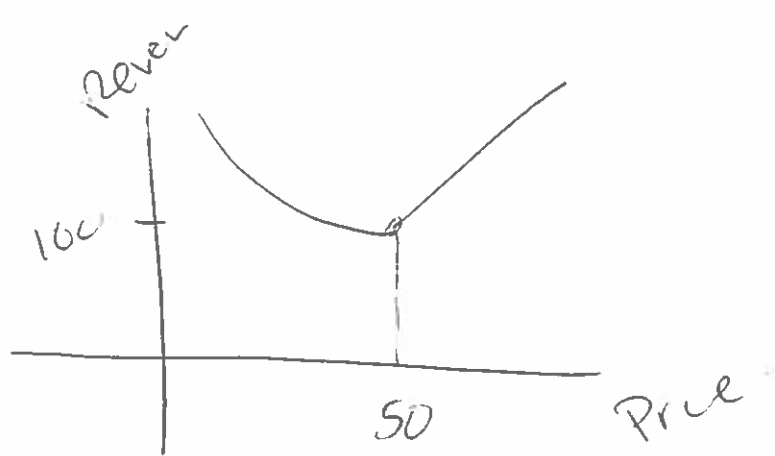
$$-\frac{1}{x} \leq \frac{\sin x}{x} \leq \frac{1}{x}$$

$$\lim_{x \rightarrow \infty} -\frac{1}{x} \leq \lim_{x \rightarrow \infty} \frac{\sin x}{x} \leq \lim_{x \rightarrow \infty} \frac{1}{x}$$

*(Note: In the original image, arrows point from the limits of the outer terms to 0, indicating they both approach 0.)*

by Squeeze Theorem

$$\lim_{x \rightarrow \infty} \frac{\sin x}{x} = 0$$



$$\lim_{x \rightarrow 50} f(x) = 100$$

As price approach \$50  
I expect to sell \$100

$\epsilon$  - epsilon

$\delta$  = delta

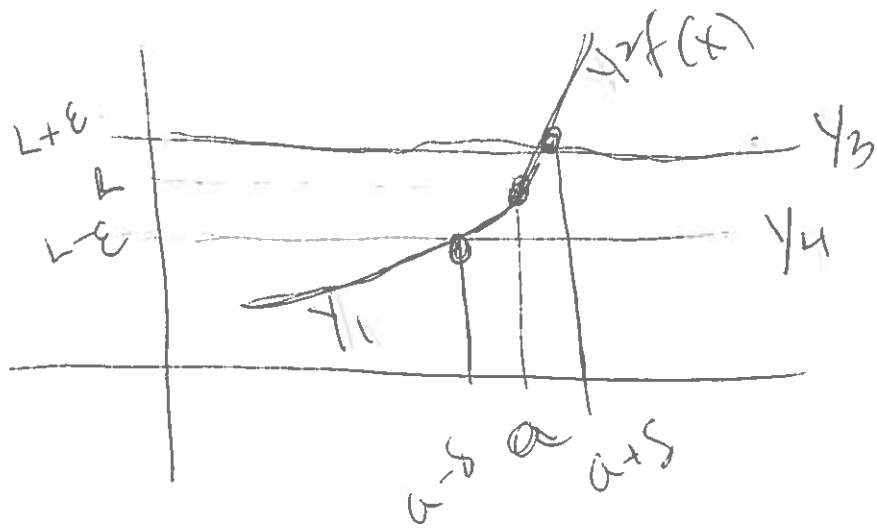
$\epsilon$  -  $\delta$  definition of Limits

$$\lim_{x \rightarrow a} f(x) = L \rightarrow \text{Given } \epsilon > 0^{\text{small}}$$

you can find  $\delta > 0$

So That

$$\text{If } |x - a| < \delta \text{ then } |f(x) - L| < \epsilon$$



$$\epsilon = .01$$

$$L = 100$$

$$y_1 = \text{reg} / (x \leq 50)$$

$$y_2 = \text{reg} / (x \geq 50)$$

$$y_3 = 100.01$$

$$y_4 = 99.99$$

Calc = 2<sup>nd</sup> | TRACE

Calc  $\delta$ : Intersect

First curve:  $y_1$   $\leftarrow$   $L + \epsilon$

2<sup>nd</sup> curve:  $y_3$   $\leftarrow$   $L + \epsilon$

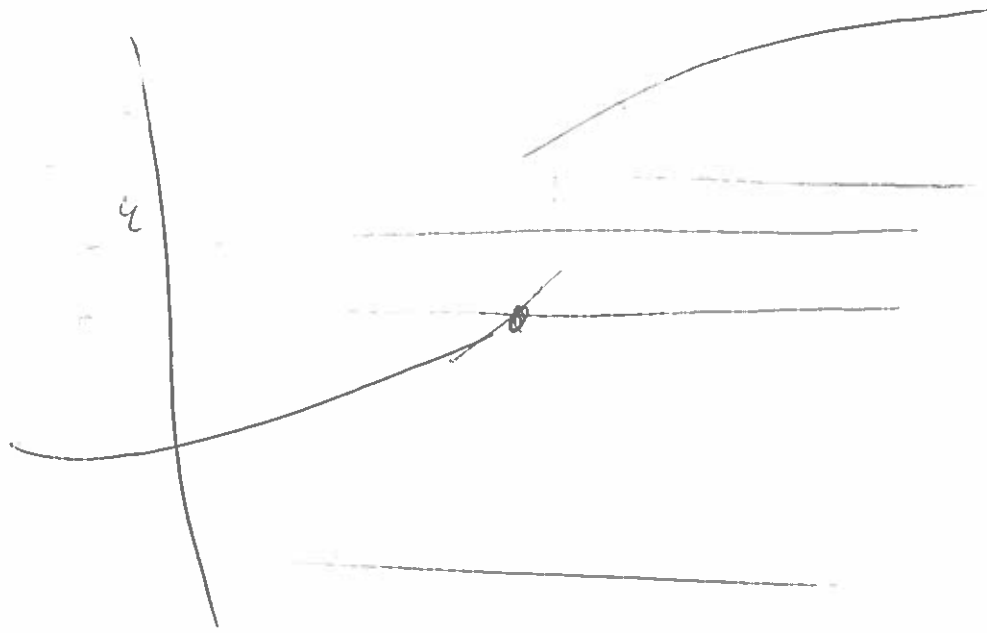
Guess: 49.

$$X = 49.951429 \quad Y = 10.724$$

$$X = 50.029185 \quad Y = 10.704$$

$$\epsilon = .01$$

$$\delta = .029$$



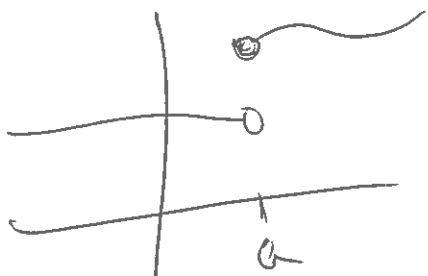
# CONTINUITY

at a point "a"

1.  $\lim_{x \rightarrow a} f(x)$  exists

2.  $f(a)$  exist

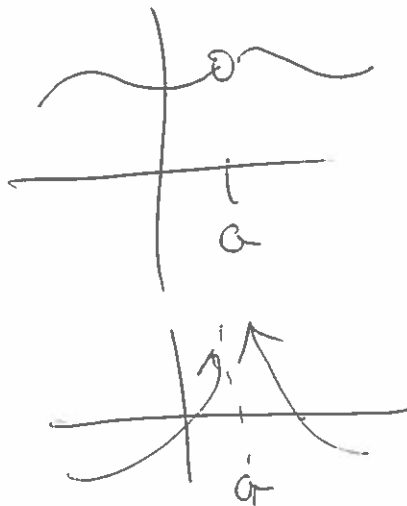
3.  $\lim_{x \rightarrow a} f(x) = f(a)$



Fails

limit  
no exist

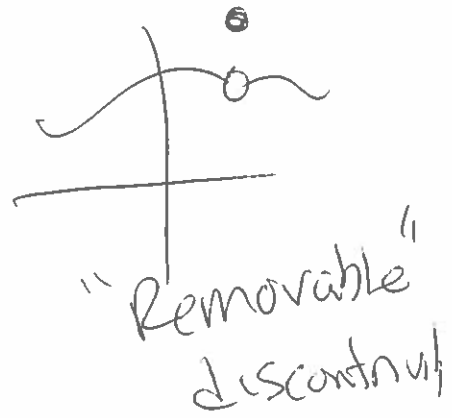
①



②

Fails

$f(a)$   
No exist



③

$\lim_{x \rightarrow a} f(x) \neq f(a)$

~~Ex~~  $f(x) = \begin{cases} Ax + 3 & x > 1 \\ x^2 - 1 & x \leq 1 \end{cases}$

$$\lim_{x \rightarrow 1^-} f(x) = 1^2 - 1 = 0$$

$$\lim_{x \rightarrow 1^+} f(x) = A + 3.$$

$$A + 3 = 0$$

$$A = -3$$



GROUP NAME: I ♥ Science

Date: 2/4/14

Student Names (First and Last)

Speaker/Presenter: Lindsay Lindsey

Writer/Prep: Corrina Hansen

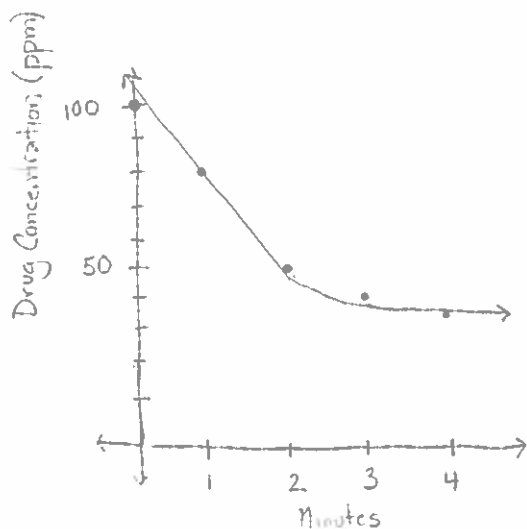
Independent Variable (x-axis): Time (Minutes)

Dependent Variable (y-axis): Drug Concentration (ppm)

Leader/Collaborator: \_\_\_\_\_

Conclusion (in words): As time approaches 2 minutes after injection, the concentration of drug approaches 56.2 ppm. As long as we remain within 0.142392 seconds of 2 minutes, we will be within 0.1 ppm of 56.2 ppm.

Supporting Work:



$$Y_1 = \text{LinReg} / (x \leq 2)$$

$$Y_2 = \text{ExpReg} / (x \geq 2)$$

$$Y_3 = 56.25$$

$$Y_4 = 56.15$$

$$\lim_{x \rightarrow 2} f(x) = 56.2$$

Intersect of  $Y_1$  and  $Y_3$ :  $x = 1.9941176$

$$y = 56.25$$

Intersect of  $Y_2$  and  $Y_4$ :  $x = 2.0023732$

$$y = 56.15$$

$$\epsilon = 0.1$$

$$\delta = 0.0023732$$

GROUP NAME:

Date: 2/4/14

Student Names (First and Last)

Speaker/Presenter: Dominique C.

Independent Variable (x-axis): \$ in 1000.00

Writer/Prep: Valleen Sincilar

Dependant Variable (y-axis): shoes

Leader/Collaborator: Maxwell B...

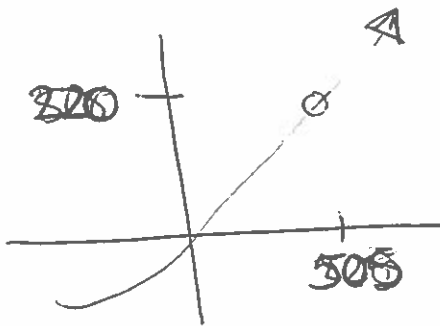
Conclusion (in words):

As the annual salary approaches \$505,000, we expect the person to own 220 pairs of shoes.

Supporting Work:

$$\lim f(x) = 220$$

$$x \Rightarrow 505$$



$$y_1 = (\text{lin Reg}) / (x \leq 505) - 11 + 0.56$$

$$y_2 = (\text{quad Reg}) / (x \geq 505)$$

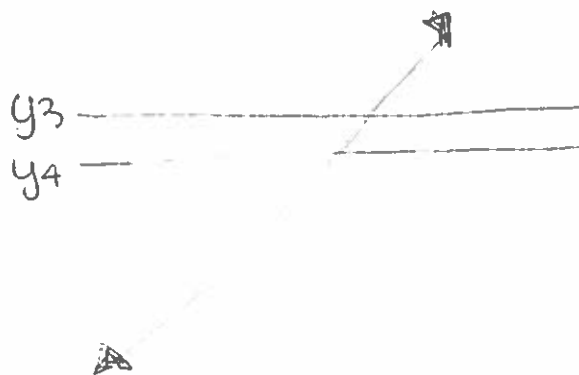
$$y_3 = 220.69 + 0.01$$

$$y_4 = 220.69 - 0.01$$

$$E = x = 505.0373$$

$$x = 504.93602$$

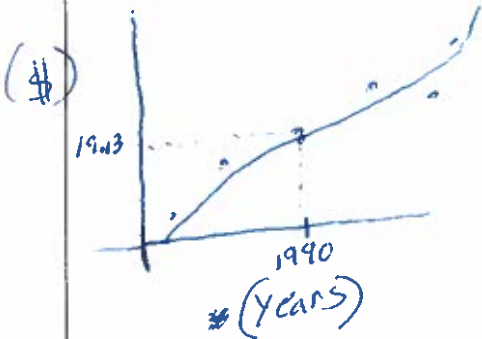
$$f = 0.0373$$



GROUP NAME: <u>the delwans</u>	Student Names (First and Last)
Date: <u>2/4/14</u>	Speaker/Presenter: <u>Brawon Reyes</u>
Independent Variable (x-axis): <u>years</u>	Writer/Prep: <u>Harrison</u>
Dependant Variable (y-axis): <u>dollars (Thousands)</u>	Leader/Collaborator: _____

Conclusion (in words): In order to maintain the salary, we need to stay within range of .2493

Supporting Work:



$$\lim_{x \rightarrow 1990} r(x) = 19.13$$

going to the year 1990, we should expect \$19.13 thousand dollars.

$$\epsilon = .1$$

$$\delta = .2493$$

Intersections

$$x_1 = 1989.7507$$

$$x_2 = 1990.3034$$

GROUP NAME: El Business

Student Names (First and Last)

Date: 1/4/14

Speaker/Presenter: Brittany Bayo

Independent Variable (x-axis): YES

Writer/Prep: Ryan Zbojovsky

Dependant Variable (y-axis): GOALS

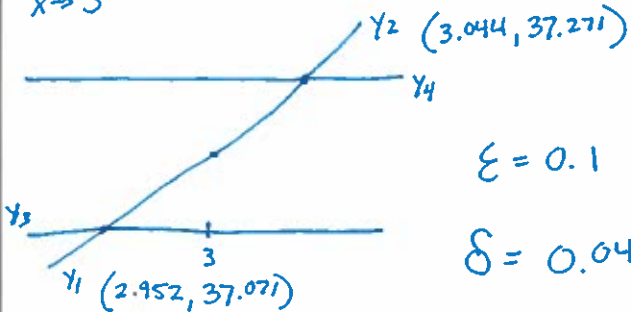
Leader/Collaborator: Andy Z

Conclusion (in words): As long as we are within 0.044 years (16 days, 1 hour, 26 min, 24 seconds) of the 3<sup>rd</sup> world cup, goals scored will be within 0.1 of 37.171.

Supporting Work:

$$y_1(3) - y_2(3) = 1.078890559$$

$$\lim_{x \rightarrow 3} r(x) = 37.171$$



$$\epsilon = 0.1$$

$$x = 2.952 \quad y = 37.071$$

$$x = 3.044 \quad y = 37.271$$

$$\delta = 0.044$$

$$y_1 = \text{ExpReg} / (x \leq 3)$$

$$y_2 = \text{QuadReg} / (x \geq 3)$$

$$y_3 = 37.171 - 0.1$$

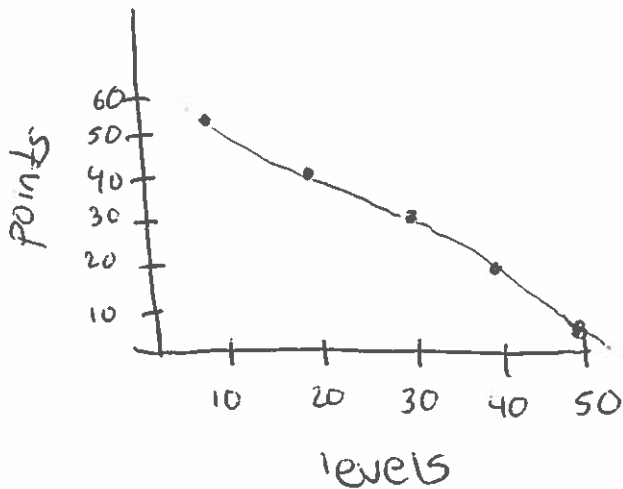
$$y_4 = 37.171 + 0.1$$

GROUP NAME: Team Squiggles  
 Date: 2/4/14  
 Independent Variable (x-axis): levels by 10  
 Dependant Variable (y-axis): points

Student Names (First and Last)  
 Speaker/Presenter: Anik  
 Writer/Prep: Mishelle Argudo  
 Leader/Collaborator: Kevin I

Conclusion (in words): As a player reaches level 30, player ears 3322points

Supporting Work:



x	y
10	52
20	42
30	34
40	21
50	5

$$E = \begin{matrix} X = 30.008 \\ X = 29.990 \end{matrix}$$

$$y = 33.219$$

$$y = 33.239$$

$$Y_1 = \text{linReg} / (x \neq 30)$$

$$Y_2 = \text{linReg} / (x \neq 30)$$

$$Y_3 = 33.219$$

$$Y_4 = 33.239$$