

# Evaluate Function $f(x)$

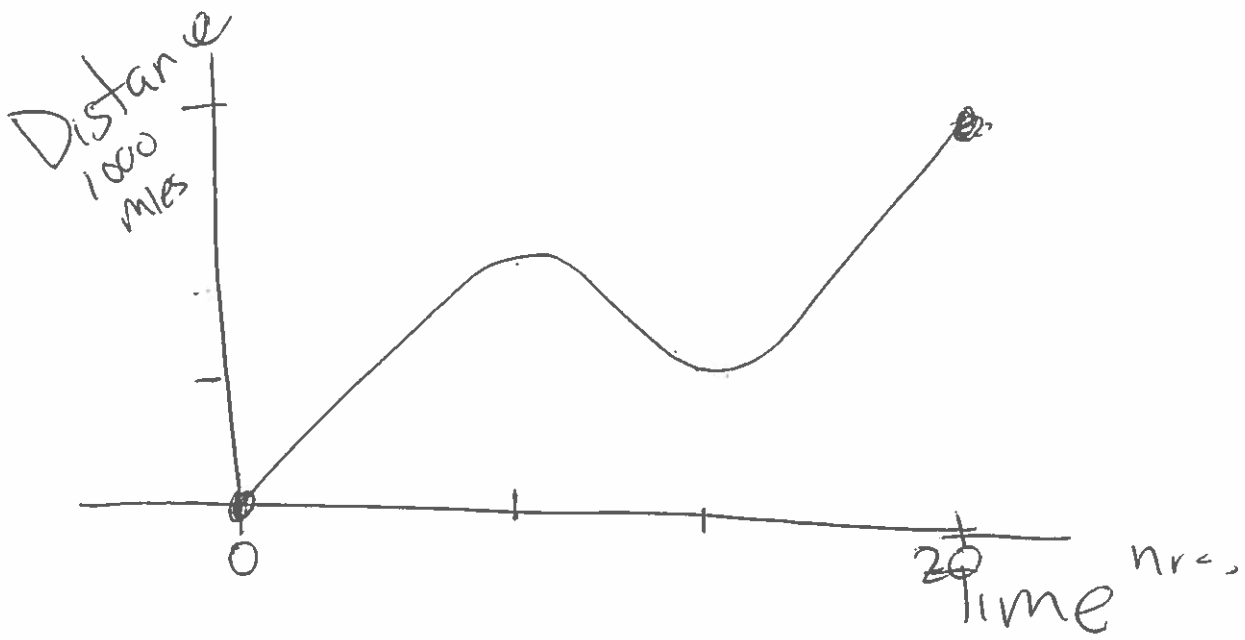
| $x$ | $f(x)$ |
|-----|--------|
| 1   | 13857  |
| 7   | 88,143 |

2nd  $\rightarrow$   $\rightarrow$   $\rightarrow$  ENT  
2nd  $\rightarrow$   $\rightarrow$  = table

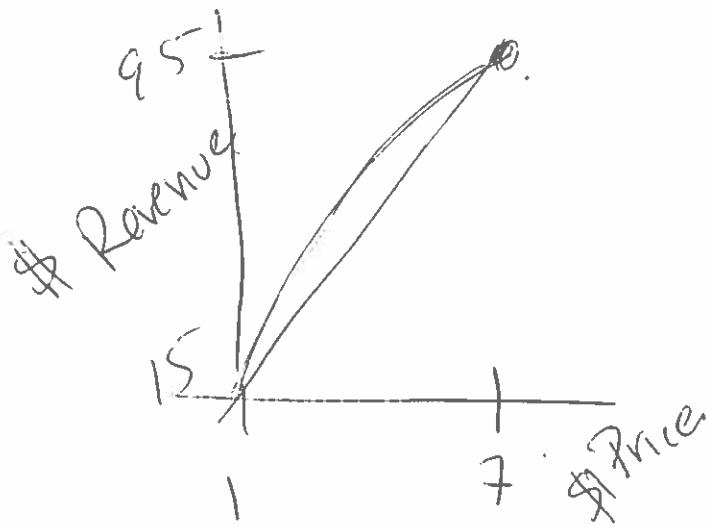
VARS  $\rightarrow$  1: Function 1:  $Y_1$

$$\frac{Y_1(7) - Y_1(1)}{7 - 1} = 12.38 \frac{\$ \text{ revenue}}{\$ \text{ price inc.}}$$

Between \$1 and \$7  
my Revenue is increasing  
at a rate of \$12.38  
per \$ increase in price



$$m = \frac{\Delta Y}{\Delta X} = \frac{1000 \text{ mi}}{20 \text{ hrs}} = 50 \text{ mph.}$$



$$\frac{\Delta Y}{\Delta X} = \frac{95 - 15}{7 - 1}$$

$$= \frac{80 \text{ \$ revenue}}{6 \text{ \$ price}}$$

$$\frac{f(b) - f(a)}{b - a}$$

# Data → Function

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## Regression

STAT ⤵ 5: Quad Reg (enter)  
↑  
Arrow Right

$$y = -2.06...x^2 + 28.88...x - 12.96...$$

## Graph Function

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Y= VARS 5: Stats ⤵ ⤵ 1: RegEq

Graph

Ave. Rate.

$$\frac{\Delta Y}{\Delta X} = \frac{Y_1(125) - Y_1(25)}{125 - 25}$$

between  
125 & 25

$$\left( \frac{Y_1(125) - Y_1(25)}{125 - 25} \right)$$

$$\frac{\Delta Y}{\Delta X} = 1.4 \frac{\$earn}{\$Price}$$

$$\left( \frac{Y_1(100) - Y_1(110)}{100 - 110} \right)$$

100 & 110

$$\frac{\Delta Y}{\Delta X} = -12.65$$

100 & 101

-10.54

100 & 99.999

-10.31



AT Price \$100

~~AT~~  
Instantaneous Rate  
of Change is

-10.31  $\frac{\$ made}{\$ Price}$

TO FIND  $\frac{dy}{dx}$

CALC = 2nd | trace

6:

$$x = 100 \quad \frac{dy}{dx} = -10.31$$

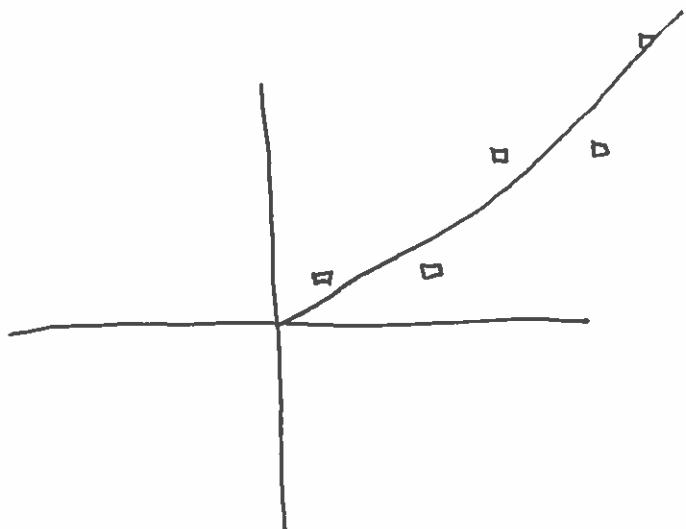
|  |  |
|--|--|
| GROUP NAME: <u>Cha-Ching</u><br>Date: <u>1/27/2014</u>                                     | Student Names (First and Last)<br>Speaker/Presenter: <u>Trey Morrill</u>           |
| Independent Variable (x-axis): <u>years</u><br>Dependant Variable (y-axis): <u>revenue</u> | Writer/Prep: <u>SHEILA MAE GAU</u><br>Leader/Collaborator: <u>Tatiana Calderon</u> |

Conclusion (in words):

REVENUE IS GOING UP \$ ~~7.72~~<sup>6.18</sup> MILLION A YEAR.

Supporting Work:

| L1   | L2 |
|------|----|
| 2013 | 35 |
| 2012 | 27 |
| 2011 | 26 |
| 2010 | 17 |
| 2009 | 16 |



**STAT** > 0 ~~Calc~~  
Exp (Enter)

$Y = ab^x$   
 $a = 2.48...$   
 $b = 1.22...$

$$\frac{(Y_1(13)) - (Y_1(9))}{13 - 9}$$

**VARS** 5 >> 5 **ENTER**

**ZOOM** 9 **GRAPH**

**BRN** **30.90**

$\Delta Y$  \$30.9 mil

$\Delta x$  2013-2009 (5 years)

revenue is going up ~~7.72~~<sup>6.18</sup> mil a year

GROUP NAME: Math ~~T~~rates

Student Names (First and Last)

Date: 01-27-2014

Speaker/Presenter: George Cumberbatch

Everyday we calculate

Independent Variable (x-axis): GB - Bandwidth (optimal)

Writer/Prep: Sharon Isoe

Dependant Variable (y-axis): time - mins

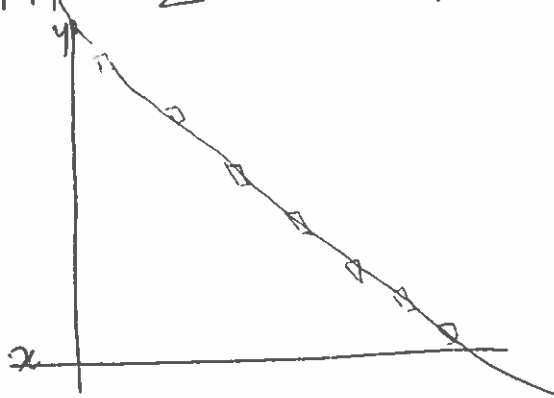
Leader/Collaborator: Furuk Feld

Conclusion (in words): - Downloading Breaking Bad on Netflix  
 Challenge → [whole series in one] day

Supporting Work:

STAT EDIT ZOOM 9

| L1  | L2                |
|-----|-------------------|
| 40  | 1 hour<br>60 mins |
| 60  | 50 min            |
| 80  | 40                |
| 120 | 20                |
| 160 | 10                |



$$\frac{\Delta y}{\Delta x} \approx \frac{-50}{120} \approx -0.41 \text{ min/GB}$$

STAT EDIT CALC

$$ax^2 + bx + c$$

$a = .0015 \dots$   
 $b = -.735 \dots$   
 $c = 87.83 \dots$   
 $R^2 = .996 \dots$

Rate of change

~~$$\frac{f(160) - f(40)}{160 - 40} = \frac{7304.9 - 7304.9}{120} = -60.87$$~~

Revenue = 7304.90  
 Price = 120  
 Rate of change avg  
 $= -40.324 \dots$

→ Higher Bandwidth speeds from optimum lower waiting time.

- Depending on purchased bandwidth download time decreases by  $\approx -0.41 \text{ min/GB}$  bandwidth

GROUP NAME: Functional Paradigm

Student Names (First and Last)

Date: \_\_\_\_\_

Speaker/Presenter: Nick Holmberg

Independent Variable (x-axis): TIME

Writer/Prep: Karol Zariski

Dependant Variable (y-axis): Disk Usage

Leader/Collaborator: Nader Shehadeh

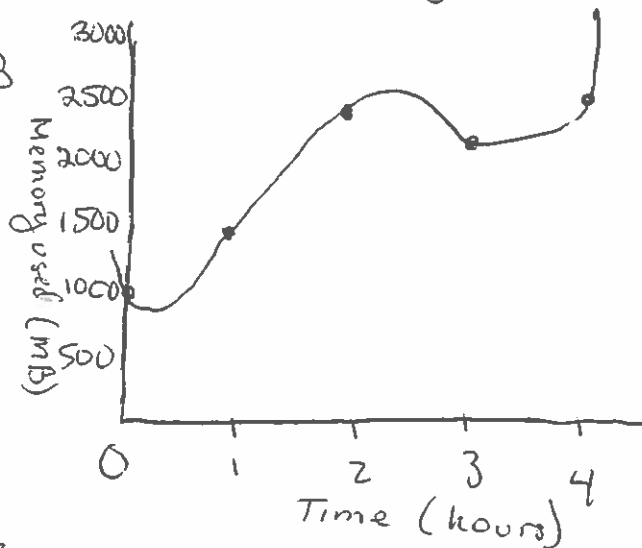
Conclusion (in words): Between 0h and 2h the computers memory used is increasing by 750mb per 1 hour

Supporting Work:

~~$y = x^2$~~

~~Number of bits,~~  
 Number of hours a computer is used vs memory used in mB

|    |         |
|----|---------|
| 0h | 1000 MB |
| 1h | 1500 mB |
| 2h | 2500 mB |
| 3h | 2250 mB |
| 4h | 2600 mB |



$$y = 149.99...x^4 - 1191.66...x^3 + 2774.99...x^2 - 1233.33x + 999.99...$$

|   |                |
|---|----------------|
| x | y <sub>i</sub> |
| 0 | 1000           |
| 2 | 2500           |

$$\frac{y_i(0) - y_i(2)}{0 - 2} = \frac{1000 - 2500}{0 - 2} = 750 \text{ mB per hour}$$



GROUP NAME: POLAR BEARZ

Student Names (First and Last)

Date: \_\_\_\_\_

Speaker/Presenter: Natalie Castillo

Independent Variable (x-axis): year

Writer/Prep: Kaushika N. N. N.

Dependant Variable (y-axis): Deaths (Due to AIDS)

Leader/Collaborator: Fredwinot B. B.

Conclusion (in words):

per year there is .10715 mill deaths due to AIDS during 2011 and 2013. / year.

Supporting Work:

| Year | Deaths due to AIDS (thousands) |
|------|--------------------------------|
| 2009 | 2.1 million                    |
| 2010 | 2.3 million                    |
| 2011 | 2.6 million                    |
| 2012 | 2.4 million                    |
| 2013 | 2.7 million                    |

Linear Regression:  $y = ax + b$

$y = .13x + -259.01$

Quad Reg:  $y = ax^2 + bx + c$

$y = -.021x^2 + 86.31x + -86918.70$

Cubic Reg:  $y = ax^3 + bx^2 + cx + d$

$y = .033x^3 + -201.12x^2 + 40449830x + -27117648$

Find Avg. Rate (Cubic Reg)

1st method (Table)

| x    | f(x)        |
|------|-------------|
| 2011 | 2.4628 mill |
| 2013 | 2.6771 mill |


$m = \frac{\Delta y}{\Delta x} = \frac{2.6771 - 2.4628}{2013 - 2011} = \frac{.2143}{2} = .10715$

$\boxed{.10715 \text{ mill deaths per year}}$

2nd method

$\frac{y'(2013) - y'(2011)}{2013 - 2011}$

$= .10715 \text{ mill deaths per year}$

GROUP NAME: illuminati 

Date: 11/27/14

Student Names (First and Last)

Speaker/Presenter: Ryan Piotrowski

Writer/Prep: Bishop Brer

Leader/Collaborator: Danyan Zhou

Independent Variable (x-axis): years

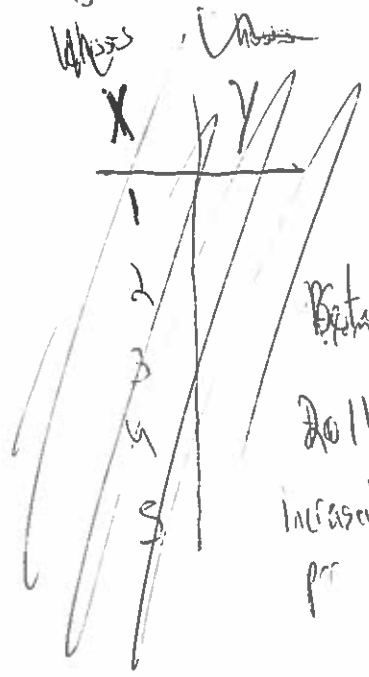
Dependant Variable (y-axis): gas prices

Conclusion (in words):

Between 1995 & 2014 the average rate increased 14¢ per year.

Cubic regression

Supporting Work:



Between 1995 & 2014 gas increased by 14¢ per year.

| X  | Y    |
|----|------|
| 95 | 1.00 |
| 02 | 1.54 |
| 05 | 2.50 |
| 12 | 3.99 |
| 14 | 3.30 |

$$\frac{3.30 - 1.00}{14 - 95} = \frac{2.3}{-83} = -0.0277$$

Quad Reg

$$y = 2.73 \cdot x^2 + 0.929 \cdot x - 10.40$$

Cubic Reg

$$y = -0.0028 \cdot x^3 + 0.045 \cdot x^2 - 93.67x + 3229.426127$$



GROUP NAME: We Mean Business!  
 Date: 1-27-14

Student Names (First and Last)

Speaker/Presenter: Christina

Independent Variable (x-axis): year

Writer/Prep: Amber

Dependant Variable (y-axis): Interest Rate

Leader/Collaborator: Kevin

Conclusion (in words): On average, the rate for a 5yr CD has dropped 1% each year since 2004 until 2008


Supporting Work:



| X<br>Year | Y<br>APY Rate |
|-----------|---------------|
| 2004      | 5%            |
| 2005      | 4%            |
| 2006      | 3%            |
| 2007      | 2%            |
| 2008      | 1%            |



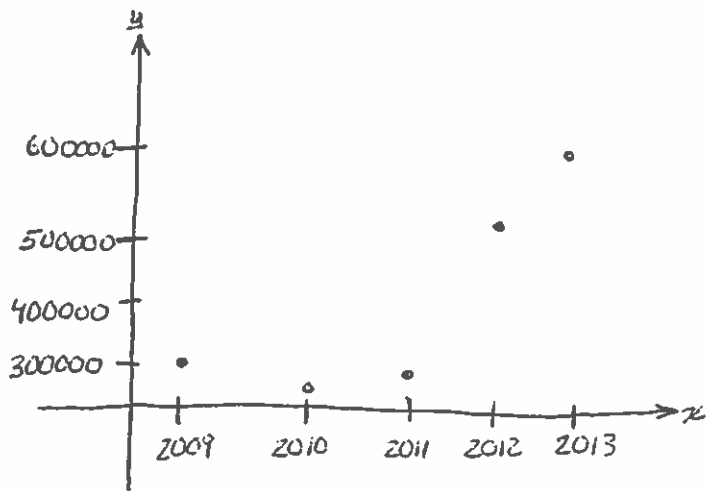
$$y = -1x + 2009$$

|   |   |
|---|---|
| GROUP NAME: <u>Best friends</u>  | Student Names (First and Last)            |
| Date: <u>1/27/2014</u>  | Speaker/Presenter: <u>Vinnie Avh. C</u>   |
| Independent Variable (x-axis): <u>TIME</u>  | Writer/Prep: <u>LAUREN DOBO</u>           |
| Dependant Variable (y-axis): <u>SALES</u>   | Leader/Collaborator: <u>ELLIOTT BATES</u> |

Conclusion (in words): THE SALE OF ELECTRIC CARS BETWEEN THE YEARS 2009 & 2013 HAS AN INCREASING RATE OF CHANGE OF \$75478 PER YEAR ON AVERAGE.

Supporting Work: SALES OF ELECTRIC CARS OVER INTERVAL OF TIME

| TIME<br>$x$ | SALES<br>$y$ |
|-------------|--------------|
| 2013        | 592192       |
| 2012        | 487480       |
| 2011        | 284067       |
| 2010        | 274555       |
| 2009        | 290292       |



CUBIC REGRESSION

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

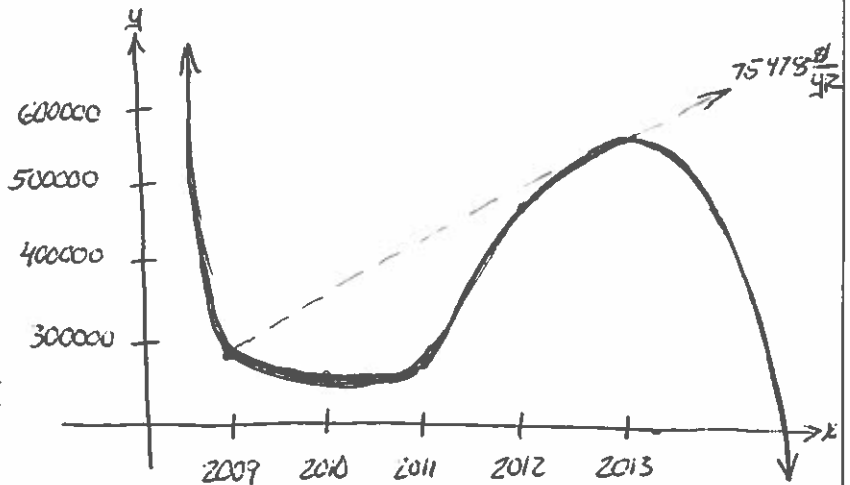
$$a = -10329.16667$$

$$b = 62346920$$

$$c = -1.25442E11$$

$$d = 8.4129662E13$$

$$M_{sec} = \frac{f(b) - f(a)}{b - a} = \frac{f(2013) - f(2009)}{2013 - 2009} = 75478 \frac{\$}{yr}$$



$$y = -10329.16667x^3 + 62346920x^2 - 1.25442E11x + 8.4129662E13$$

THIS FUNCTION HAS A RATE OF CHANGE OF \$75478/YEAR IN THE POSITIVE DIRECTION.

GROUP NAME: MoneyMakers

Student Names (First and Last)

Date: 1/27/14

Speaker/Presenter: Bryan Sapon

Independent Variable (x-axis): year

Writer/Prep: Edna Onyiah

Dependant Variable (y-axis): crime rate

Leader/Collaborator: Monica Kanchanawong

Conclusion (in words):

Crime Rate in Detroit after legalizing marijuana over the last 5 years.

Supporting Work:

DATA → Function: **STAT**  $\rightarrow$  5: Quad Reg  $\langle$  Enter  $\rangle$

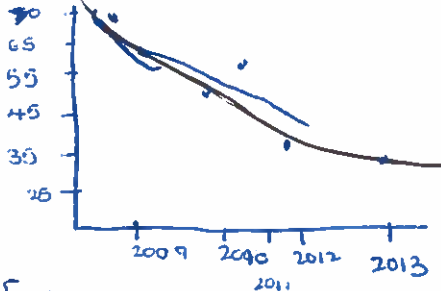
| x    | y   |
|------|-----|
| 2009 | 75% |
| 2010 | 52% |
| 2011 | 59% |
| 2012 | 44% |
| 2013 | 39% |

$$y = ax^2 + bx + c$$

$$y = .01x^2 - 40.3x + 40602.608$$

Graph Function

**Y=** **Vars** 5: Stats  $\rightarrow$  1: RegEQ



**Stat** 1: Edit

| L1 | L2 |
|----|----|
| x  | y  |

Evaluate Function

**2nd** **Graph** = table

**2nd** **Window**  $\rightarrow$  **1**  $\rightarrow$  **1**  $\rightarrow$  **ENTER**

**VAR**  $\rightarrow$  **1**  $\rightarrow$  Function **1**: Y1

$\frac{75\% - 39\%}{5} = 6.8\%$

~~5.15 - 6.18~~

**2nd**  $\rightarrow$  **Y=**  $\rightarrow$  **STAT PLOTS**: 1  $\rightarrow$  Enter

**ZOOM**: 9

y. 2009 — 2010  
6.98 — 6.18

Conclusion

Between 2009 and 2013 The crime rate dropped by 5%

per year and over the last 5 years over all, the crime rate decreased by 28%.