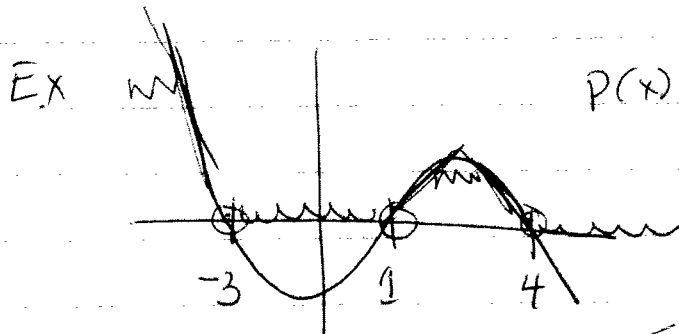


# Polynomial Inequalities

$$P(x) > 0$$



$P(x) > 0$  Mountains

1, 4, -3 zeros

$$(-\infty, -3) \cup (1, 4)$$

$0 > 0$  False

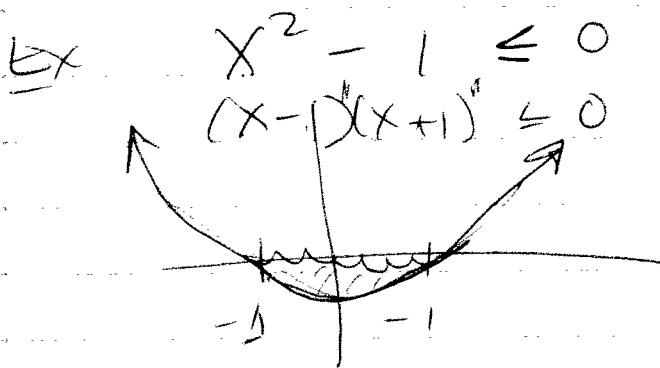
If  $P(x) \geq 0$

$$(-\infty, -3] \cup [1, 4]$$

$0 \geq 0$  True

$$P(x) < 0$$

Revers/Orears



$$-1 \leq x \leq 1$$

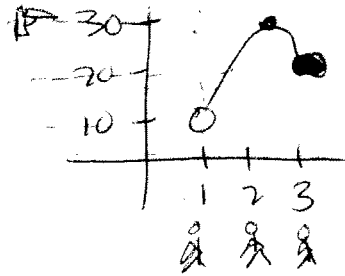
or

$$[-1, 1]$$

Ex Find Domain/Range

Data

$L_1$	$C_2$
1	2
3	4
5	6



Equations

①  $f(x) = \frac{1}{x+B}$   $x+B \neq 0$   
 $x \neq -B$

②  $g(x) = \sqrt{x-C}$   $x-C \geq 0$   
 $x \geq C$

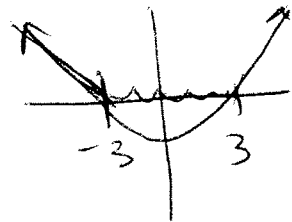
Domain:  $\{1, 3, 5\}$   
 Range:  $\{2, 4, 6\}$

Domain:  $(1, 3]$   
 Range:  $[10, 30]$

Domain: 2 Rules  
 Range: Have to Graph

Ex Find Domain for  $y = \sqrt{x^2 - 9}$

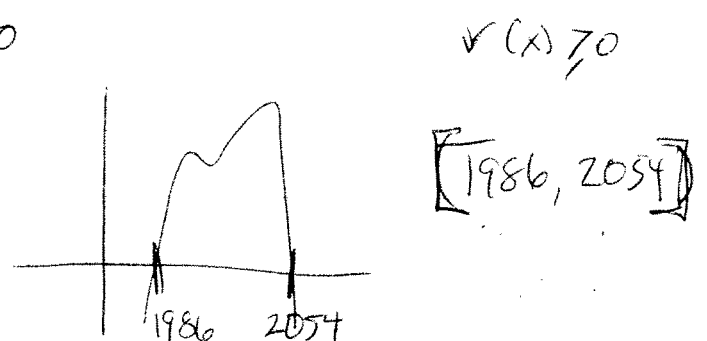
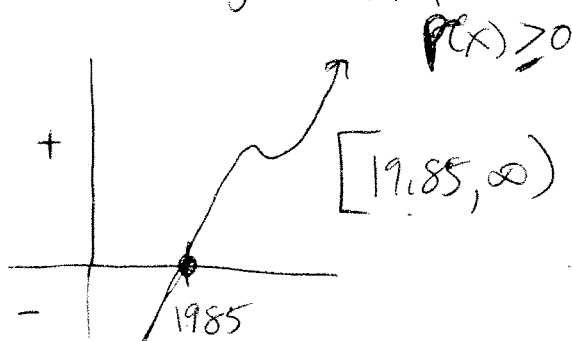
$x^2 - 9 \geq 0$  MOUNTAINS?  
 $(x-3)(x+3) \geq 0$   
 \* zeros: 3, -3



$(-\infty, -3] \cup [3, \infty)$

Cubic Regression

Quartic



$$V = L \times W \times H$$



$$4H \times (H+3) \times H = 113$$

$$y_1 = 4x \cdot (x+3) \cdot x$$

$$y_2 = 113$$

Zoom

6°

Ymax: 120

~~Zoom~~

~~0: ZoomSet~~

Calc 5: Intersect

<enter> <enter> <enter>

$$X = 2.307$$

$$Y = 113$$

For 1 Answer... Use Solver

Math

0: Solver or B: Solver

$$0 = 4x(x+3)x - 113$$

(x = 10 guess)

alpha

ENTER

= Solve

W  $X = 2.307$  ...

$$(x - 6 - 4i)(x - 6 + 4i)$$

$$[(x - 6) - 4i][(x - 6) + 4i]$$

$$(x - 6)^2 + 16$$

$$x^2 - 12x + 36 + 16$$

Zeros:  $-4, -3 + i, [-3 - i]$

$$(x + 4)(x + 3 - i)(x + 3 + i)$$

$$f(x) = x^3 + x^2 + 8x - 10$$

Zero  
1

$$f(1) = 1 + 1 + 8 - 10 = 0$$

Factor  
(x - 1)

$$\frac{x^3 + x^2 + 8x - 10}{x - 1} = \frac{(x - 1)A}{(x - 1)}$$

$$x - 1 \overline{\begin{array}{r} x^2 + 2x + 10 \\ x^3 + x^2 + 8x - 10 \\ - (x^3 - x^2) \end{array}}$$

$$(x - 1)(x^2 + 2x + 10) = 0$$

$$\begin{array}{r} 2x^2 \\ - (2x^2 - 2x) \\ \hline 10x - 10 \end{array}$$

$$x^2 + 2x + 10 = 0$$

$$x = \frac{-2 \pm \sqrt{4 - 40}}{2}$$

$$\frac{-2 \pm \sqrt{-36}}{2}$$

$$\frac{-2 \pm 6i}{2}$$

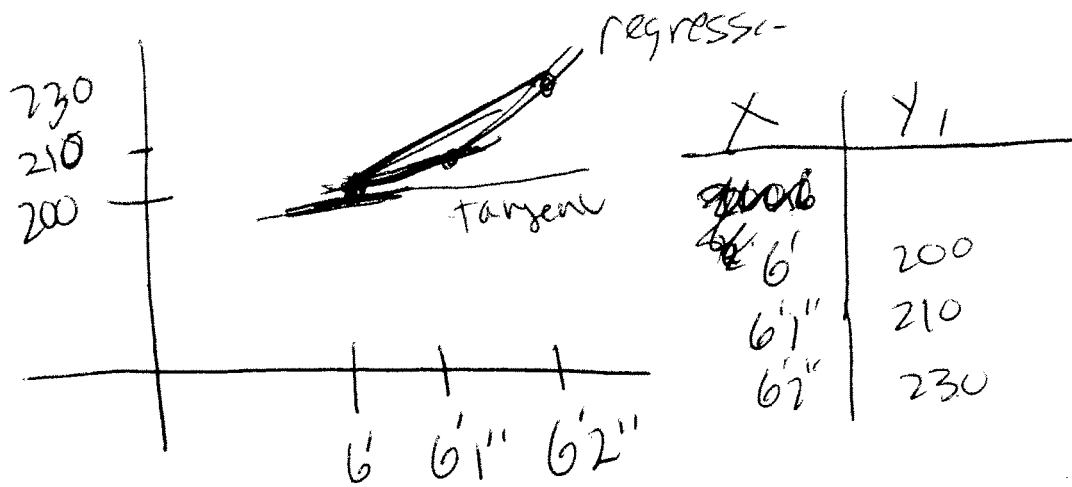
$$-1 \pm 3i$$

Factors  $(x-1)(x+1-3i)(x+1+3i)$

Where or when =  $x$ -values

What =  $y$ -values

# Average Rate of Change.



From 6'2'' to 6'  $\frac{\Delta Y}{\Delta X} = \frac{230 - 200}{6'2'' - 6'} = \frac{30 \text{ lbs}}{2 \text{ in}}$

From 6'1'' to 6'  $\frac{\Delta Y}{\Delta X} = \frac{210 - 200}{6'1'' - 6'} = \frac{10}{1''}$

## Instantaneous Rate of Change.

From 6'0'' to 6'0''  $\frac{200 - 200}{6 - 6} = \text{undefined}$



Slope of Tangent Line

$Y_i =$  regression eq.

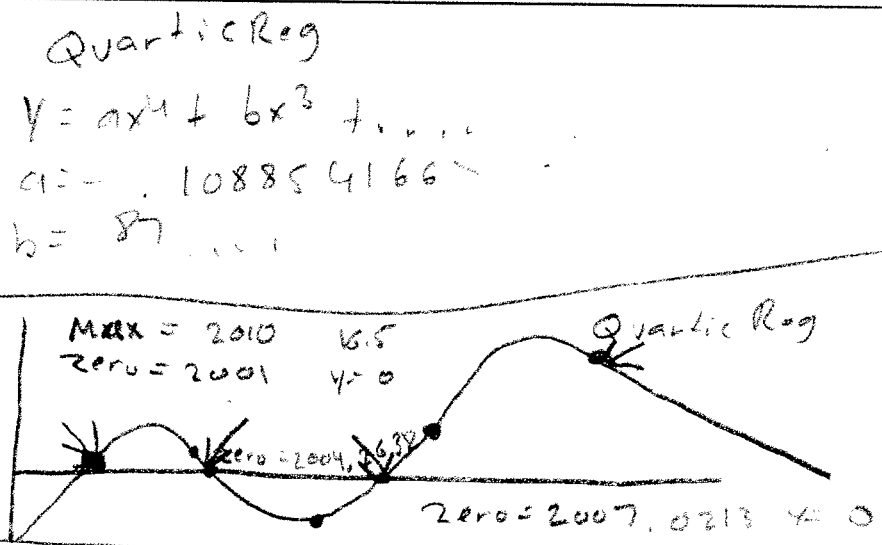
Calcl 6:  $dy/dx$

$x = 10 \quad dy/dx = -0.37067 \dots$

GROUP NAME:	Student Names (First and Last)
Logo:	Speaker/Presenter: <u>Stan Kaplan</u>
Date: <u>9/16/13</u>	Writer/Prep: <u>Stan Kaplan</u>
Topics: <u>Lady Gaga</u>	QC/Leader: <u>Danyan Zhou</u>

Instructions: This will show the sales that Lady Gaga had from the year 2002 to 2010

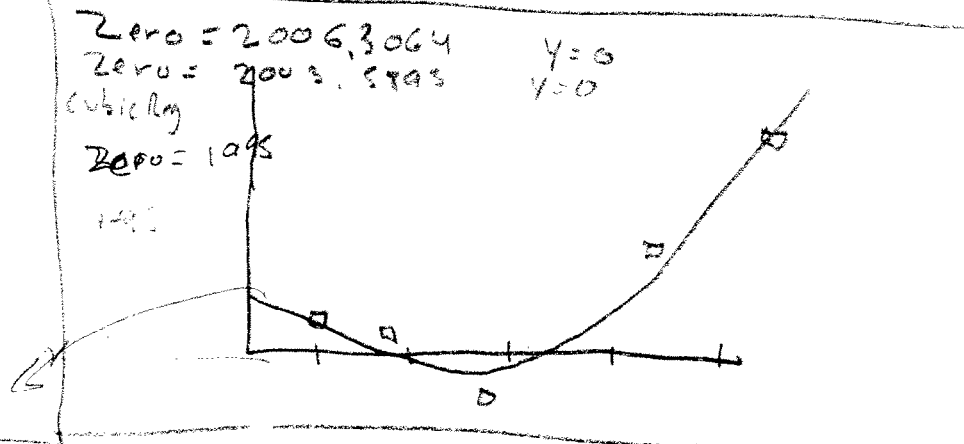
Input	
L1	L2
2002	1.5
2004	2
2006	-4
2008	6.8
2010	15.9



Cubic Reg

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

$a = .05$   
 $b = -300.2928371$   
 $c = 601170.5429$   
 $d = -401164652.5$



From 2006 to 2003 she earns the money from RAS she loses money. After 2008 she makes money

GROUP NAME:

Student Names (First and Last)

Logo:

Speaker/Presenter: Avik Khanuja

Date: 9/16

Writer/Prep: Nicole Bonelli

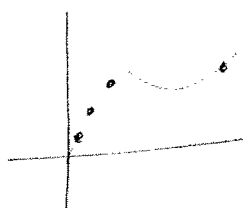
Topics:

QC/Leader: Jon Sabino

Instructions:

min.	grades
15	30
24	62
37	70
58	92
190	100

zero (4.39, 0)



2 complex  $\psi$ s (Cubic)

Disco Right

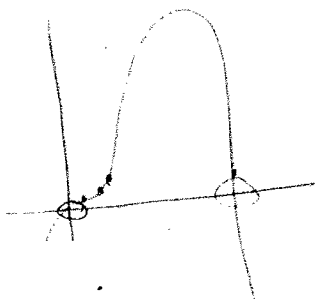
$$y = ax^3 + bx^2 + cx + d$$

$a = 1.22$   
 $b = -.03$   
 $c = 3.73$   
 $d = -15.64$

as long as you study more than 4.39 mins you will get a positive grade

2 zeroes

(9.94, 0)



2 complex zeroes

(191.82, 0)

As long as you study between 9.94 mins - 191.82 mins you will have a positive grade.

Sad Parabola

$$y = ax^4 + bx^3 + cx^2 + dx + e$$

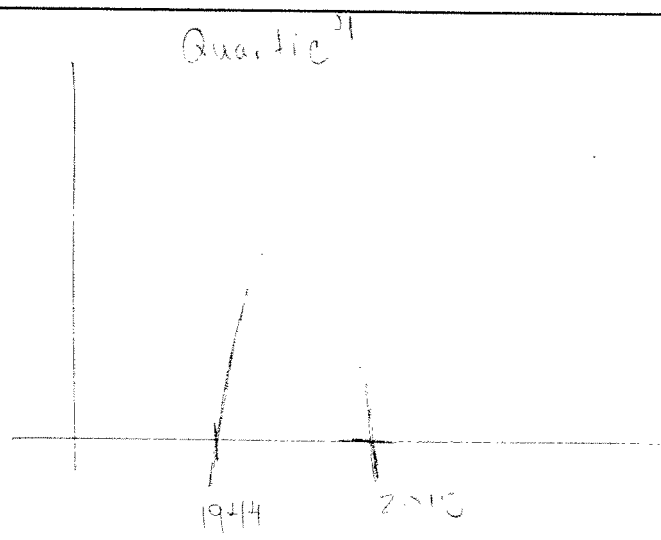
$a = -1.5$   
 $b = .004$   
 $c = ~~3~~ -0.39$   
 $d = 13.7$   
 $e = -101.5$



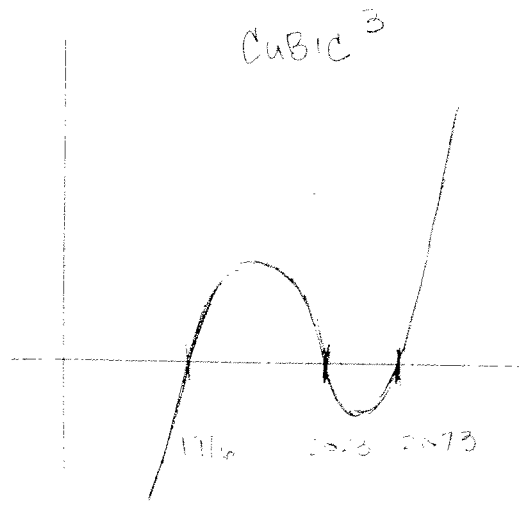
<p>GROUP NAME: <u>VA ENGINEERING</u></p> <p>Logo:</p>	<p>Student Names (First and Last)</p> <p>Speaker/Presenter: _____</p>
<p>Date: <u>9/16/13</u></p> <p>Topics:</p>	<p>Writer/Prep: <u>Vinnie Avhuf</u></p> <p>QC/Leader: <u>Harrison Sunden</u></p>

Instructions: Joe Kramery

Transistors Produced  
[1944, 2013]



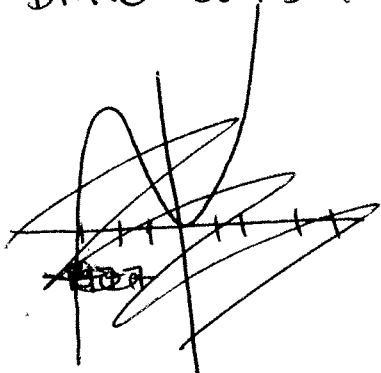
[1916, 2023] U [2073, ∞)



<p>GROUP NAME: <u>I love Math</u></p> <p>Logo:</p>	<p>Student Names (First and Last)</p> <p>Speaker/Presenter: <u>Lucy Meng-yi Gu</u></p>
<p>Date: <u>9/16/13</u></p> <p>Topics:</p>	<p>Writer/Prep: <u>Scott</u></p> <p>QC/Leader: <u>Rex</u></p>

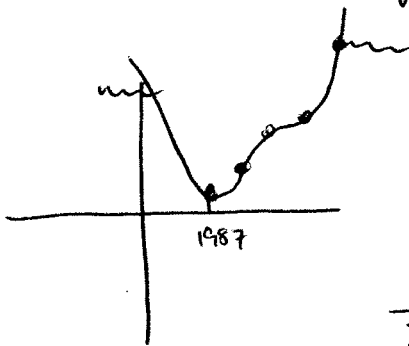
Instructions:

BMW Sales after new model/production line



$(1984, \infty)$  ~~the~~  $f(1984) \geq 0$

BMW's sales made money after 1984.



$(-\infty, 1987] \cup [1987, \infty)$

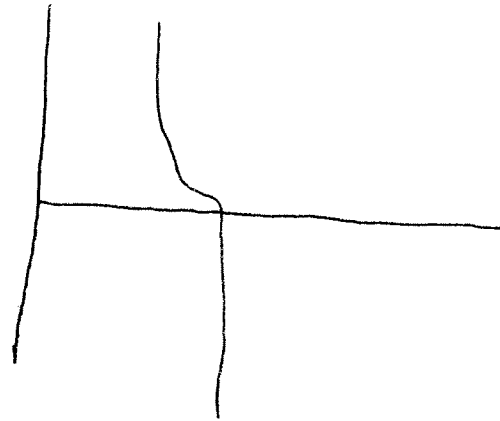
BMW's sales <sup>always</sup> made money after ~~1987~~

GROUP NAME:	Student Names (First and Last)
Logo:	Speaker/Presenter: <u>Trey</u>
Date: <u>9/16</u>	Writer/Prep: <u>DOMINIQUE</u>
Topics:	QC/Leader: _____

Instructions:

Cubic

yr.	Qrt.
12	6
11	9
10	9
9	20
8	35

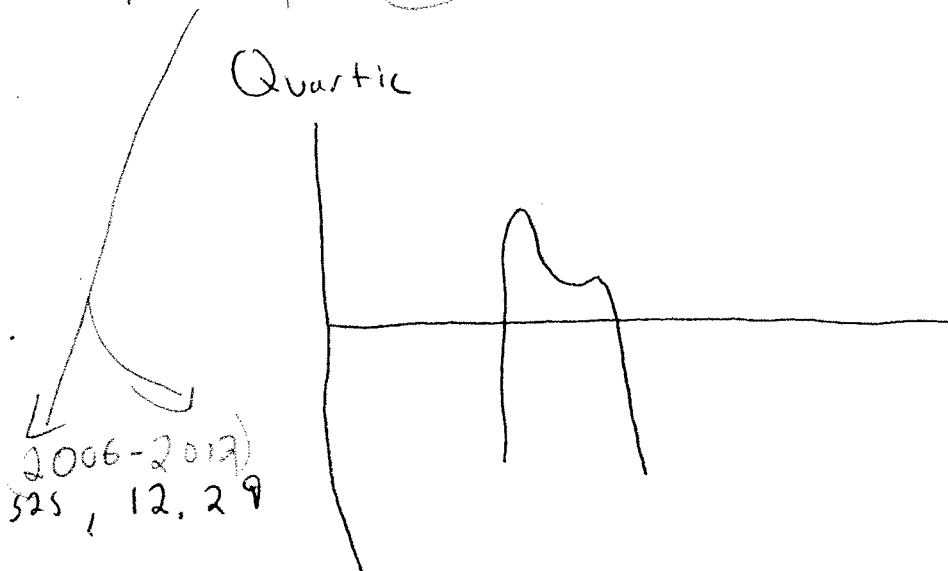


Iphones


Sales were + up until

Zeros:  $x = 13.40$   $y = 0$

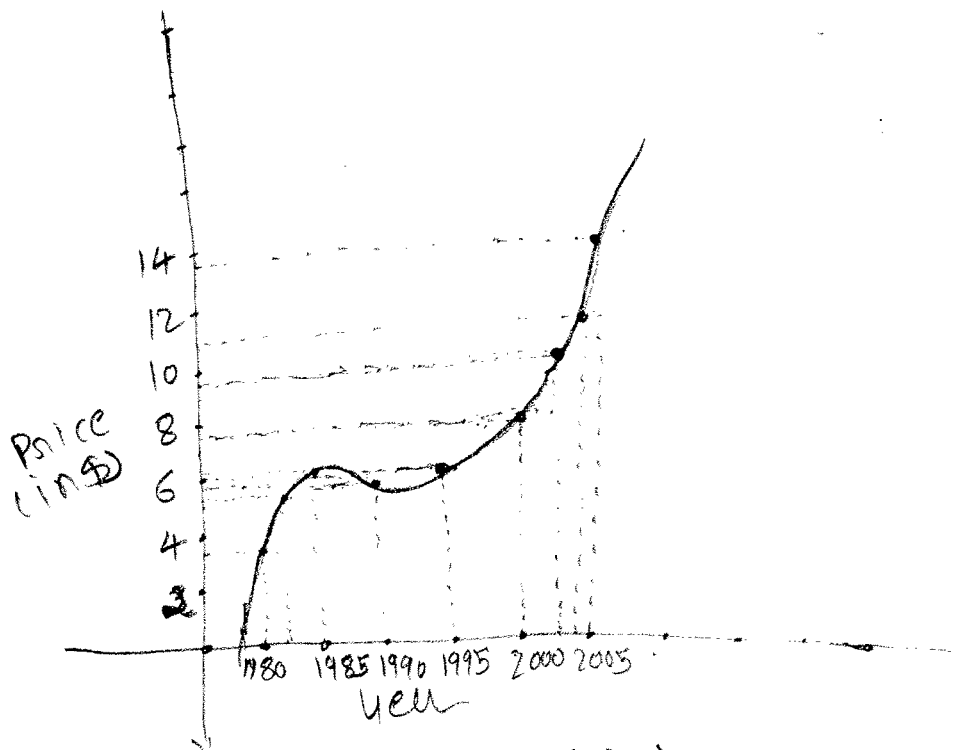
Quartic



Zeros:  $6.325, 12.29$   
 (2006-2012)

GROUP NAME: <u>ILM.</u>	Student Names (First and Last)
Logo: 	Speaker/Presenter: <u>Jake Peoples</u>
Date: <u>09/16/2013.</u>	Writer/Prep: <u>Hazel Dexui.</u>
Topics: <u>Average Price of Natural Gas</u> <u>in the US</u>	QC/Leader: <u><del>Kevin</del> Kevin Velasquez</u>
Instructions: - Plot year on x-axis Plot price on y-axis. Find maximum, minimum & zero.	

x	y
1980	3.68
1982	5.17
1985	6.12
1990	5.80
1995	6.06
1998	6.82
2000	7.76
2003	9.52
2004	10.74
2005	13.84



$y = ax^3 + bx^2 + cx + d$   
 $a = .0027$   
 $b = -16.42$   
 $c = 32703.57$   
 $d = -21700042.38$

Maximum (1987, 6.26)  
 Minimum (1993, 5.81)  
 zeros (1976, 0)

→ The equation have one zero and  
 • + two imaginary zeros.  
 Domain (-∞, ∞).  
 Range (-∞, ∞)

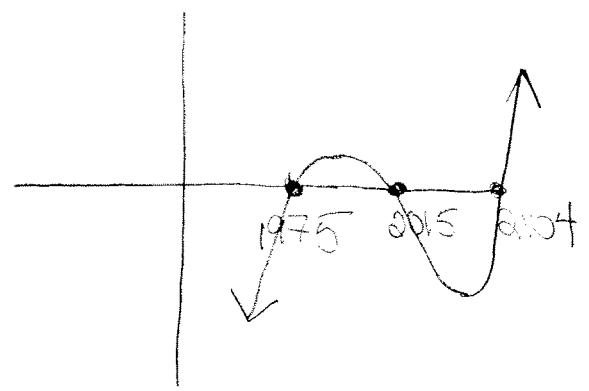
<p>GROUP NAME:</p> <p>Logo:</p>	<p>Student Names (First and Last)</p> <p>Speaker/Presenter: <u>Rachel J, Jelena</u></p>
<p>Date: <u>9/16/13</u></p> <p>Topics:</p>	<p>Writer/Prep: <u>Alex, Kausalya,</u></p> <p>QC/Leader: _____</p>

Instructions:

Data

1980	10,000
1985	15,000
1990	19,000
1995	24,000
2000	17,000
2005	12,000
2010	8,000

Graph



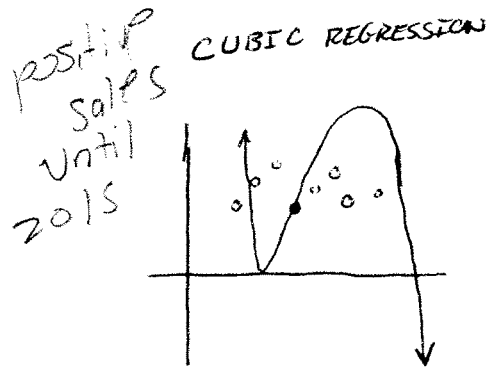
zeros: 1975, 2015, 2104

CD sizes are positive between 1975 and 2015  
 but between 2015 & 2104 CD sizes are in the negatives

GROUP NAME:	Student Names (First and Last)
Logo:	Speaker/Presenter: <u>Natalie Castillo</u>
Date: <u>9/16/2013</u>	Writer/Prep: <u>LAUREN DOBO</u>
Topics: <u>CAMERA SALES</u>	QC/Leader: <u>Both</u>

Instructions:

YEAR (20-xx)	SALES (THOUSANDS)
06	5.172
07	6.957
08	7.920
09	4.287
10	5.082
11	6.294
12	4.967
13	6.129
14	5.238

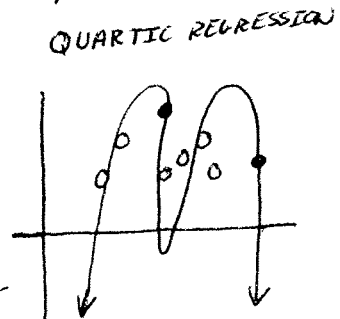


ZERO:  $x = 15.813$   
 $7.872$

~~\_\_\_\_\_~~  
 $(-\infty, 7.872), (7.872, 15.813), (15.813, -\infty)$

CUBIC REGRESSIONS: CAMERA SALES BECOME NEGATIVE AT THE LATER PART OF 2015

QUARTIC REGRESSIONS: CAMERA SALES BECOME NEGATIVE IN LATER 2005 AND 2014

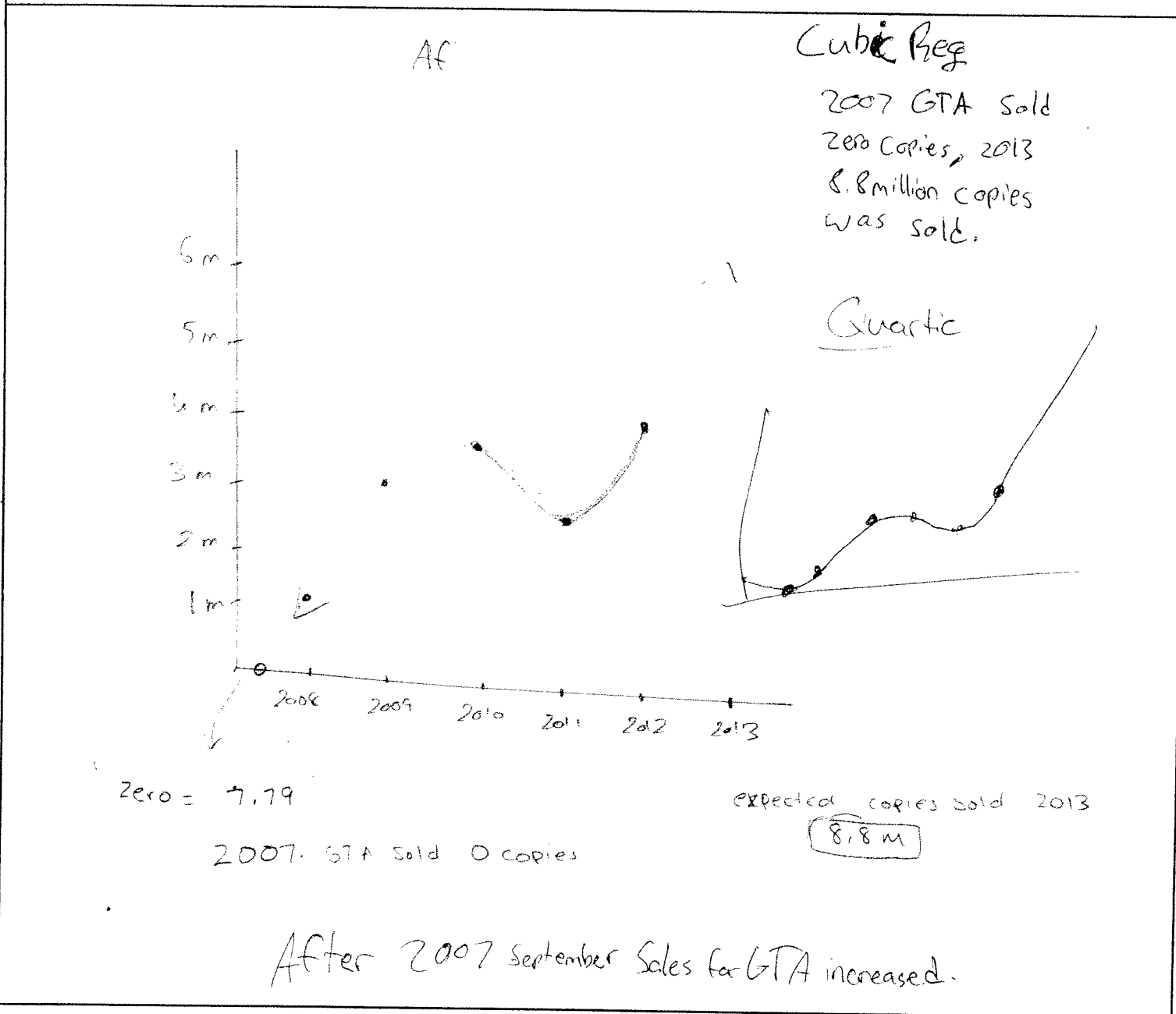


Btw 2005 to 2010  
So 2008 to 2010

$(-\infty, 5.45], [5.45, 8.82] \cup [10.11, 14.25],$   
HS ~~is~~ positive  $[14.25, \infty)$

<p>GROUP NAME: <u>30 min</u></p> <p>Logo:</p>	<p>Student Names (First and Last)</p> <p>Speaker/Presenter: <u>Brandon Rivera</u></p>
<p>Date: <u>9/16/13</u></p> <p>Topics:</p>	<p>Writer/Prep: <u>Darshit Jariwala</u></p> <p>QC/Leader: <u>Suraw Gurmah</u></p>

Instructions:

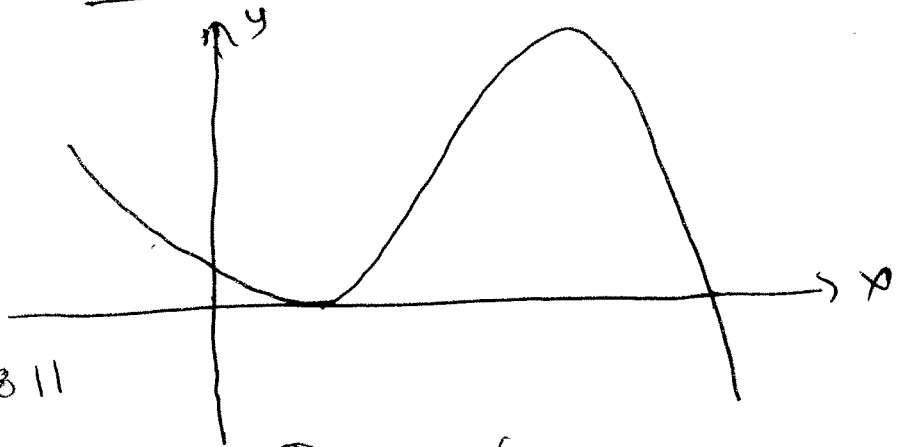


GROUP NAME: <u>LOVE math</u>	Student Names (First and Last)
Logo:	Speaker/Presenter: _____
Date: <u>9/16</u>	Writer/Prep: <u>Sharon Isoe</u>
Topics: <u>DVD</u>	QC/Leader: <u>Onur Turkan</u>
Instructions: <u>sales DVD</u>	

Sales on DVD

People	Sales
<u>21</u>	<u>5</u>
10	25
20	50
30	100
40	120
50	

Quadratic Quadratic



$$\frac{2!}{76.2811}$$

zeros = 75.70

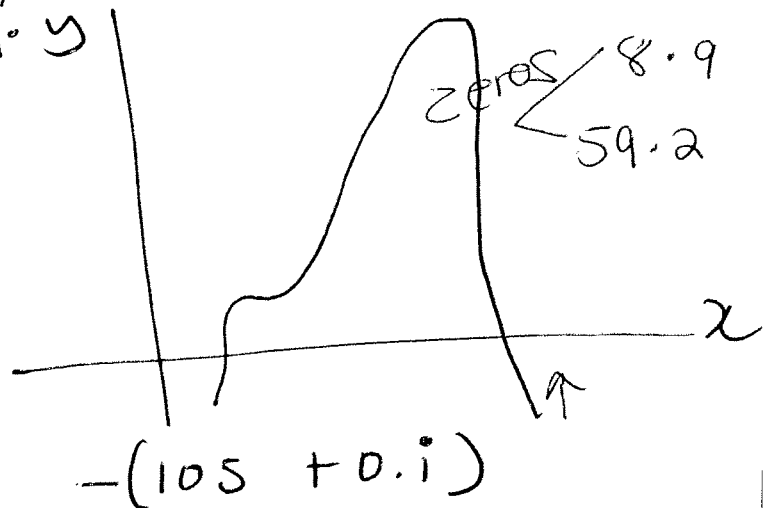
Quadratic - 5 roots  
4 complex

3 complex

$$10.1969 - 5.62475i$$

$$10.1969 + 5.62475i$$

If there are 75.70 customers in my DVD store my regression graph tells me there will be no sales.



$$f(x) = -0.0029x^3 + 0.2803571x^2 - 4.904x + 30$$

If there are 8.9 to 59.2 customers in store I will have constant sales.