

# Zeros of Polynomials

X-intercepts = Zeros you can see on graph

Others  
Zeros = Complex Zeros

Example      Zeros: 2, -3  
Factors:  $x-2$ ,  $x+3$

$$f(x) = (x-2)(x+3)$$

Imaginary Numbers:  $\sqrt{-1} = i$   $i^2 = -1$

Complex Numbers:  $a + bi$   
real                      imaginary

$$\frac{3+2i}{5+i} = \frac{(3+2i)(5-i)}{(5+i)(5-i)} = \frac{17+7i}{26}$$

Imaginary Zeros:  $i$ ,  $-i$   
Factors:  $x-i$ ,  $x+i$

$$f(x) = (x-i)(x+i) = x^2 + xi - xi - i^2 = x^2 + 1$$

REAL

Poly. of degree 3

Zeros 2,  $1-i$ ,  $1+i$

Factors:  $(x-2)(x-1+i)(x-1-i)$

$$(x-1)^2 + 1$$

$$x^2 - 2x + 1 + 1$$

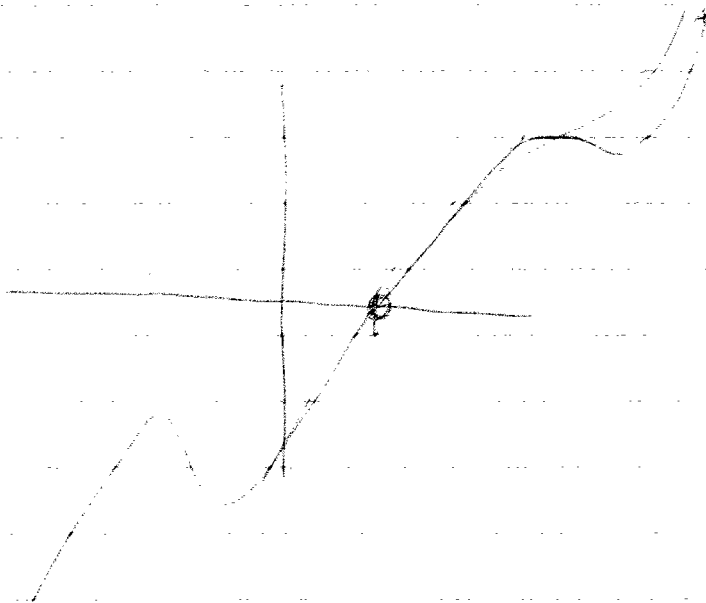
$$(x-2)(x^2 - 2x + 2)$$

$$\frac{x-2}{x-2}$$

$$-2x^2 + 4x - 4$$

$$x^3 - 2x^2 - 2x$$

$$x^3 - 4x^2 + 6x - 4$$



$$f(x) = x^2 + 1$$

$$y = x^2 + 1$$

4410

yes

Zeros:  $2 + 3i$   $2 - 3i$

Factors:  $(x - 2 - 3i)(x - 2 + 3i)$

$$(x - 2)^2 + 9$$

$$x^2 - 4x + 13 = 0$$

$$x = \frac{4 \pm \sqrt{16 - 4 \cdot 13}}{2}$$

Biggest Poly.

$$y = (x^2 + 1)(x^2 - 4x + 13)(x - 2)^2(x + 3)$$

Degree  $2 + 2 + 2 + 1 = 7$

Factors 7 or less

FT of A

Number

Zeros: # 7 zeros

Zeros:  $-i, +i, 2 + 3i, 2 - 3i, 2, 2, -3$

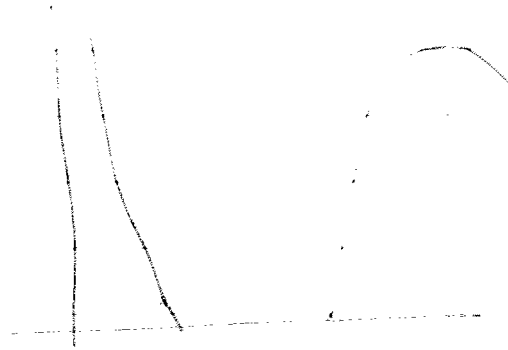
$(x+i)(x-i)$

X Intercepts  $2, -3$  distinct

Roots  
Textures

Pass. Thru

Height	Weight
60"	110
73"	170
72"	200
70"	130
71"	175



Plot

2nd | Y= | L1-V, L2-W  
 200, V1 | 9:

Find Regression

Linear

STAT | 4:


$$y = ax + b$$

$$y = 3.5638x - 113.59$$

Y= | VARS | 5 | 1.

GRAPH

GROUP NAME: ILM

Logo: 

Date: 09/11/2013

Topics: Determine the temperature at which photosynthesis is most efficient

Student Names (First and Last): \_\_\_\_\_

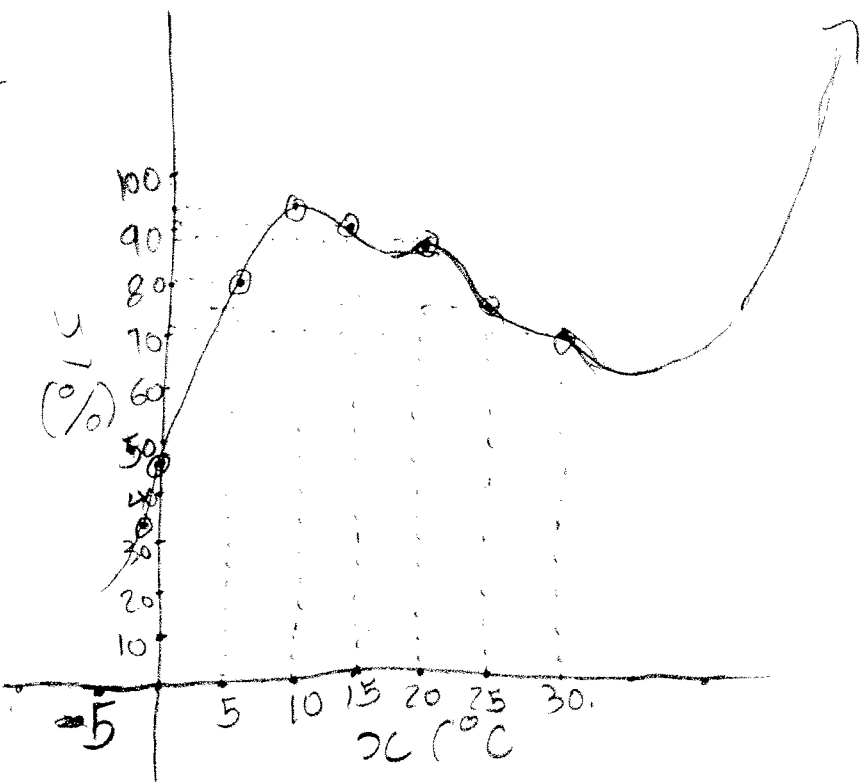
Speaker/Presenter: Jake Peebles

Writer/Prep: Hiral Desai

QC/Leader: Kevin Volasquez

Instructions: - plot temperature on x-axis.  
- plot % of photosynthesis

x (°C)	y (%)
-1.5	33
0	46
5	80
10	93
15	91
20	89
25	77
30	72

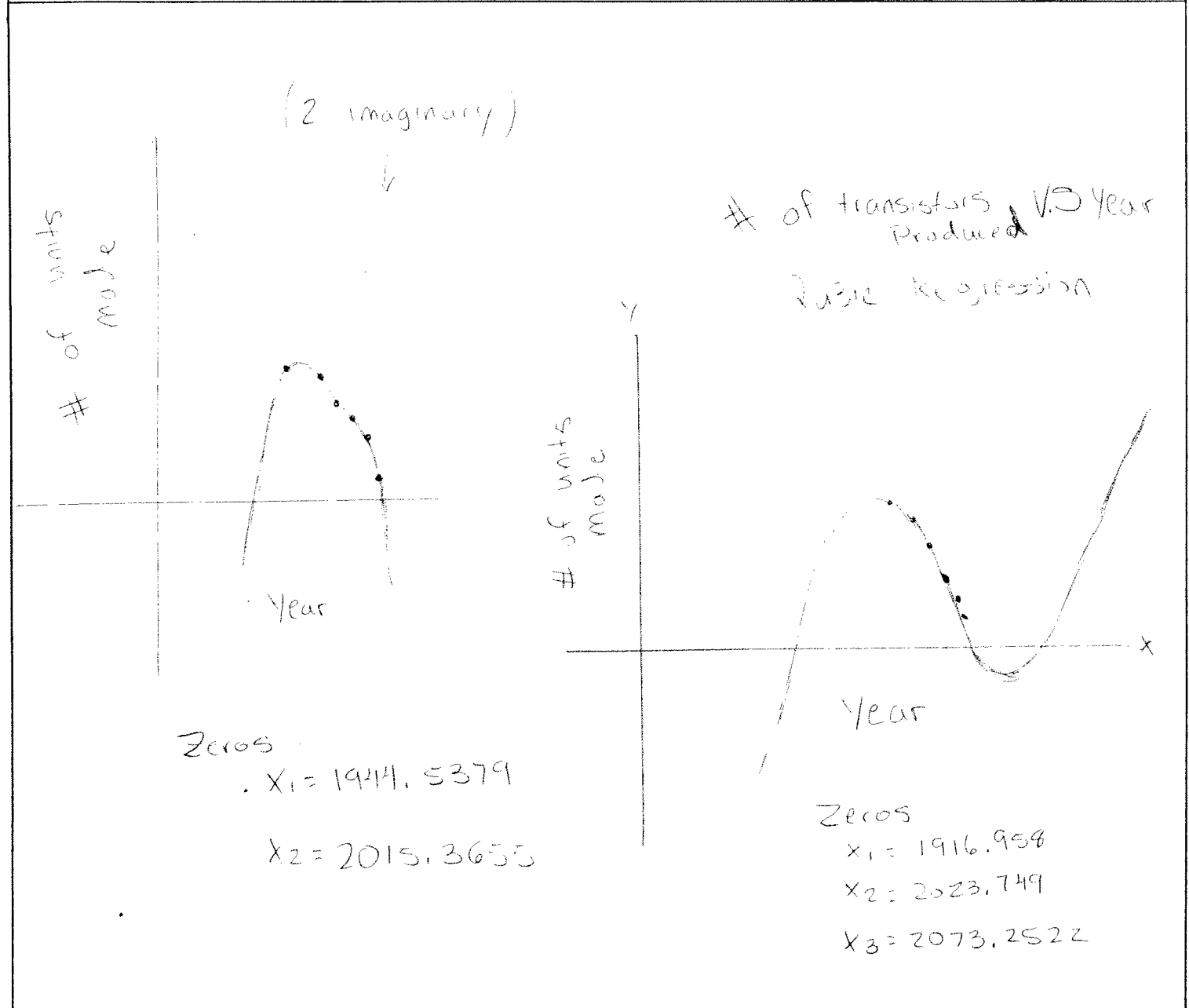


Max (13.34, 94.17)  
 Min (32.88, 69.90)  
 zero. (-4.233, 0)

Conclusion:  
 At 13.34°C, photosynthesis is most efficient  
 - one zero two imaginary.

<p>GROUP NAME: <u>DA ENGINEERS</u></p> <p>Logo:</p>	<p>Student Names (First and Last)</p> <p>Speaker/Presenter: <u>Joseph Kparwany</u></p>
<p>Date: <u>9-11-13</u></p> <p>Topics: <u>HOW MANY TRANSISTORS PER YEAR</u></p>	<p>Writer/Prep: <u>JIM KUKON</u></p> <p>QC/Leader: <u>Harrison Sander</u></p>

Instructions: CUBIC REGRESSION  
QUARTIC REGRESSION



GROUP NAME:	Student Names (First and Last)
Logo:	Speaker/Presenter: <u>derlinesimon</u>
Date: <u>9/11</u>	Writer/Prep: <u>Sharon Isoe</u>
Topics:	QC/Leader: <u>Onur Turkan</u>

Instructions:

L1	L2	
10	5	cubic regression $y = ax^3 + bx^2 + cx + d.$
20	25	
30	50	
40	100	
50	120	
75	0	$a = -0.0029$
		$b = 0.2803571$
		$c = -4.9041$
		$d = 30$

disco left

real zeros = 1

complex zeros = 2

Quadratic.

$$y = ax^4 + bx^3 +$$

$$a = -3.125$$

$$b = 0.03458$$

$$c = -1.2687$$

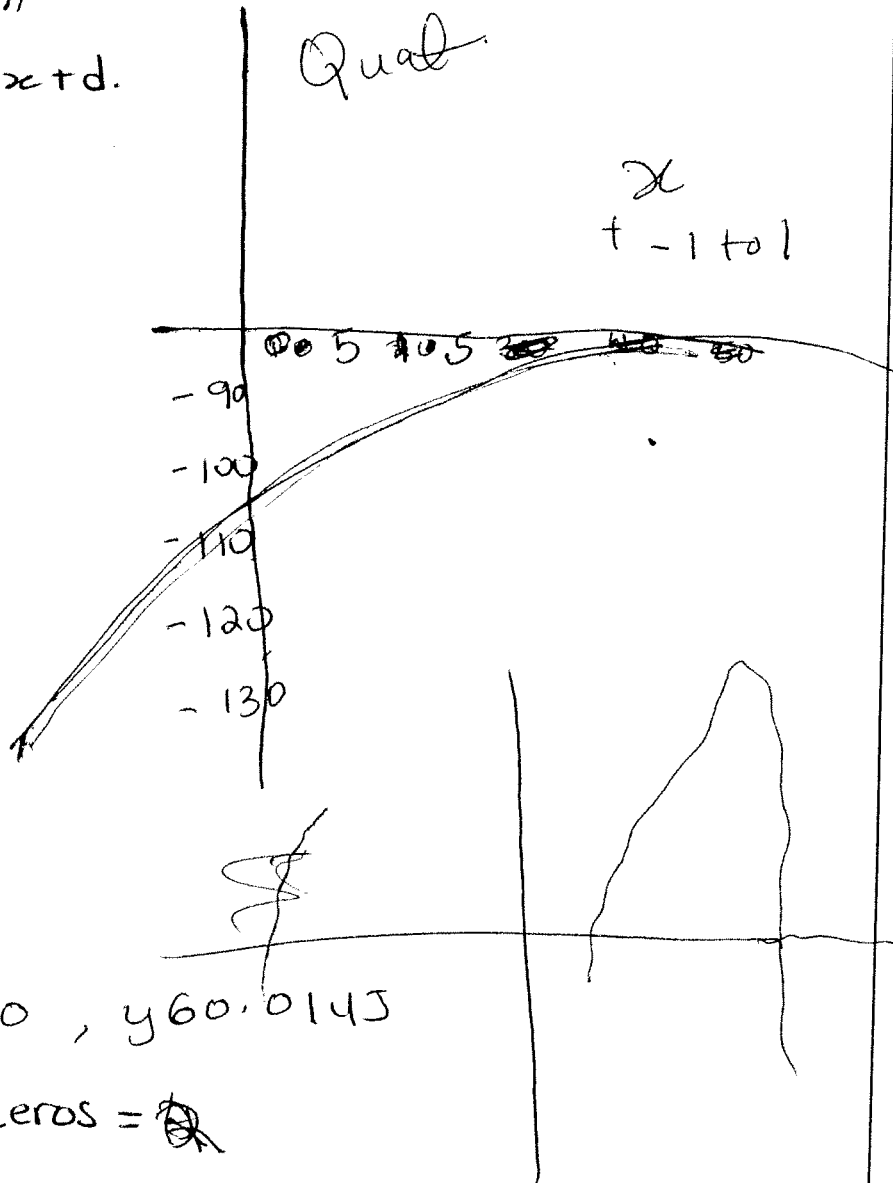
$$d = 20.541$$

$$e = -105$$

disco left


complex zeros = 2

real zeros = 2



$$x = 0, y = 60.0145$$

GROUP NAME: Tony Mantana

Logo: 

Date: 9/11/13

Topics:

Student Names (First and Last)

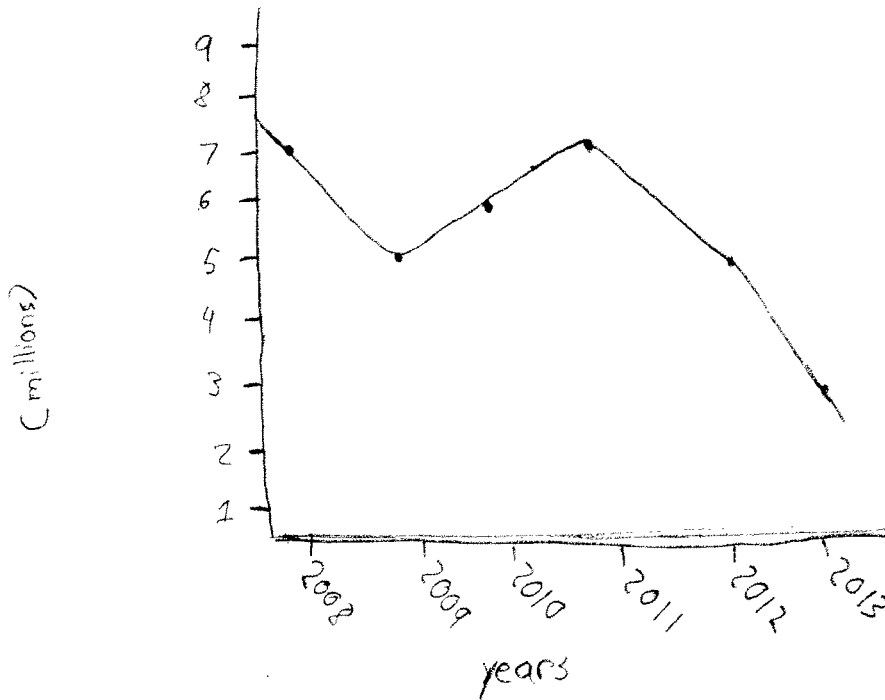
Speaker/Presenter: Brandon Palmer

Writer/Prep: Darshit Jivwala

QC/Leader: SIMON GURMAN

Instructions: Cubic Regression

Lady Gaga Sales





<p>GROUP NAME:</p> <p>Logo:</p>	<p>Student Names (First and Last)</p> <p>Speaker/Presenter: <u>Kawakawa, M</u></p>
<p>Date: <u>7/11/13</u></p> <p>Topics:</p>	<p>Writer/Prep: <u>Yelena B, Valerie Springer</u></p> <p>QC/Leader: <u>Alex Routenville</u></p>

Instructions:

Lotus	car sales
1950	500
1951	531
1952	541
1953	611
1954	700

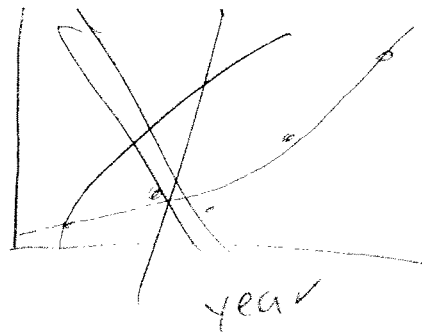
car sales

Toyota sales

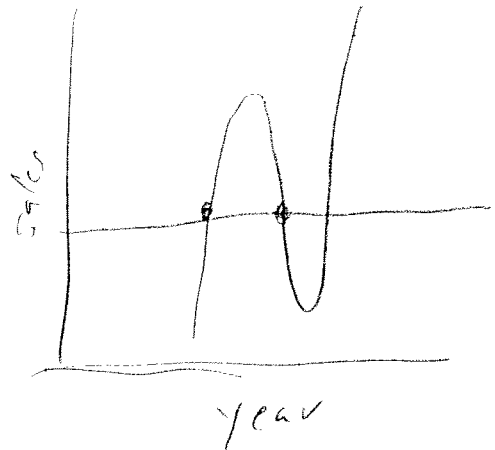
increase → AS ad investment increases


Zero:

Cubic Reg



Cubic Reg



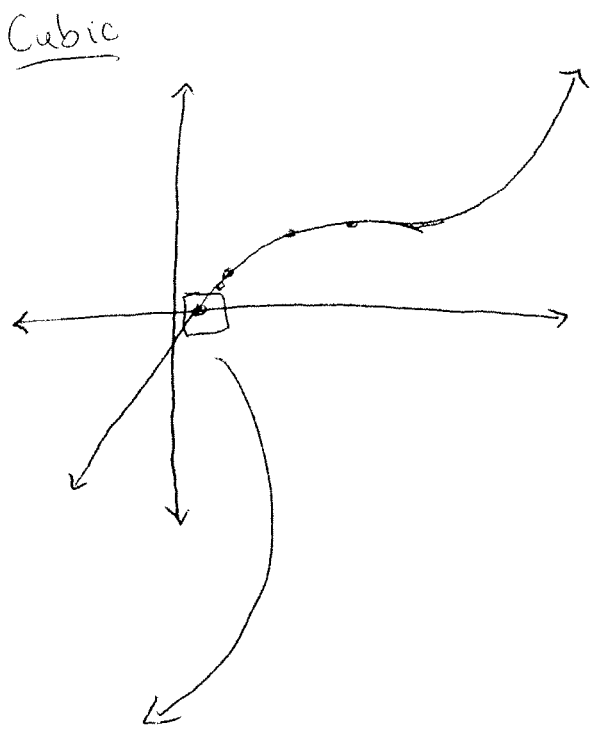
GROUP NAME: <u>Math Lovers</u>	Student Names (First and Last)
Logo: 	Speaker/Presenter: <u>Nicole Bonelli</u>
Date: <u>9/11/13</u>	Writer/Prep: <u>Avik Khaneja</u>
Topics:	QC/Leader: <u>Jon Jabino</u>

Instructions: ~~Quadratic~~ Cubic Regression

Time Studying VS Test Score

Mins Stud

<del>L1</del>	<del>L2</del>
<del>5</del>	<del>6</del>
<del>1.2</del>	<del>35</del>
<del>1.9</del>	<del>42</del>
<del>2.8</del>	<del>83</del>
<del>3.4</del>	<del>94</del>



zero: (11.6, 0)

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

- a = 5.10
- b = -.01
- c = 2.63
- d = -28.1

<u>Mins Studying</u>	<u>Test Score</u>
15	6
28	35
37	42
78	83
114	94

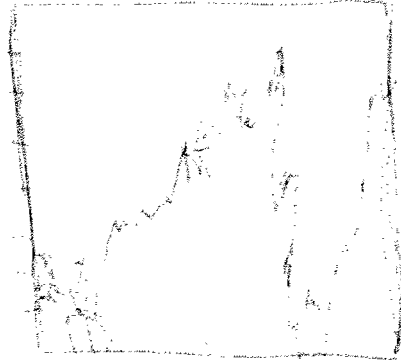
GROUP NAME: P. Simon's crew  
 Logo: PL  
 Date: 9/11  
 Topics: LINE REGRESSION & GEOMETRY

Student Names (First and Last)  
 Speaker/Presenter: Stan Kaplan  
 Writer/Prep: Vaughn Stryker  
 QC/Leader: Darvan Zhou

Instructions: IN 1949, 2000 PEOPLE WERE  
GRADUATED.

Year	Grades
1950	142
1951	3,060
1952	5,942
1953	3,112
1954	6,724
1955	6,123

LINEAR REGRESSION



$Z_{1950} = 691 = 0.1583(1950 - 1949)$   
 (Full regression)

QUADRATIC REGRESSION



$Z_{1950} = 1949(9/2)$   
 (Full regression)

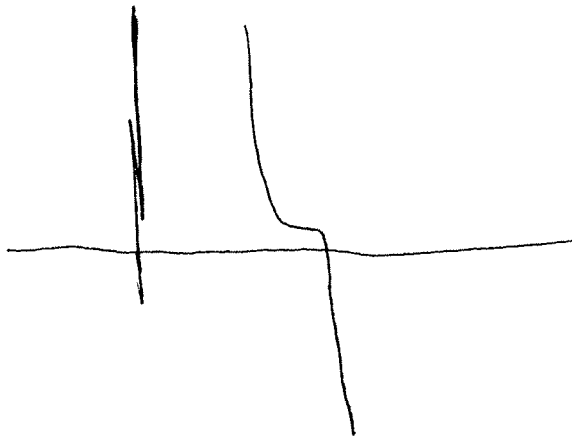
$Y = ax^2 + bx + c$   
 $a = -3167.3011$   
 $b = 31872.2487$   
 $c = -40274202.39$

<p>GROUP NAME: <u>TTD</u></p> <p>Logo:</p>	<p>Student Names (First and Last)</p> <p>Speaker/Presenter: <u>Trey Murrill</u></p>
<p>Date: _____</p> <p>Topics: <u>SALE OF IPHONES</u></p>	<p>Writer/Prep: <u>Dominique Bosta</u></p> <p>QC/Leader: <u>Tatiana Laird</u></p>

Instructions:

Year	Qtr.
12	6
11	9
10	9
9	20
8	35

Cubic Regression

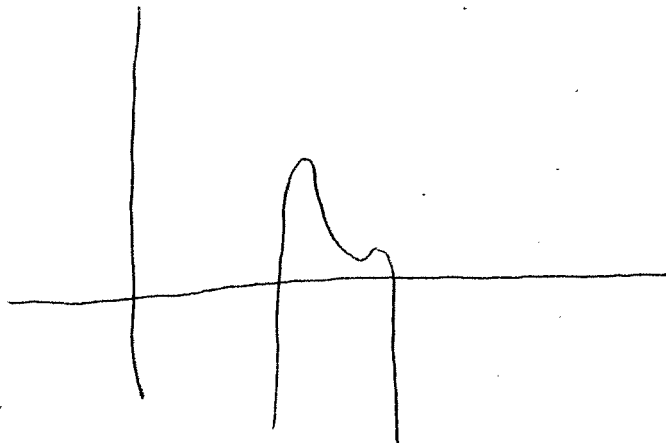


2013 =  $\otimes$

zero

$$x = 13.406854 \quad y = 0$$

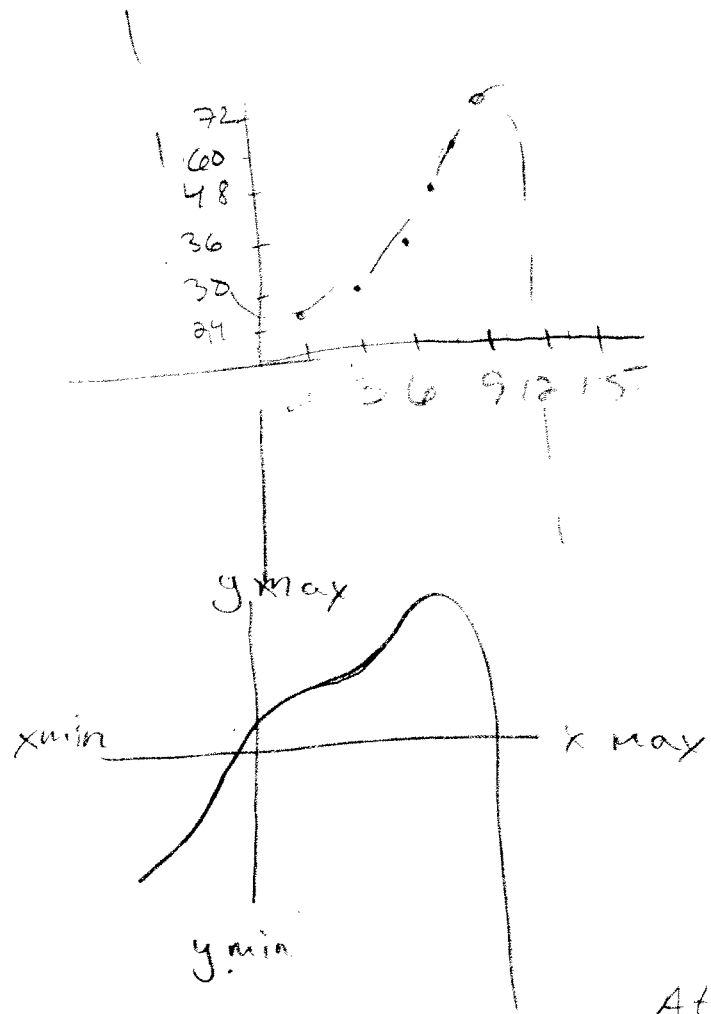
Quartic Regression



NONE

<p>GROUP NAME:</p> <p>Logo:</p>	<p>Student Names (First and Last)</p> <p>Speaker/Presenter: <u>Lucy (Mengni) Guo</u></p>
<p>Date: <u>9/11/13</u></p> <p>Topics: <u>zeros, coefficients, factors</u></p>	<p>Writer/Prep: <u>Scott Sliker</u></p> <p>QC/Leader: <u>Rex Zheng</u></p>

Instructions:



cubic neg:  
 3 factors / - coeff.  
 zeroes = 1R, 2i  
 (50.02, (x-50.02,

At 50 years old you'd be 0 inches tall.

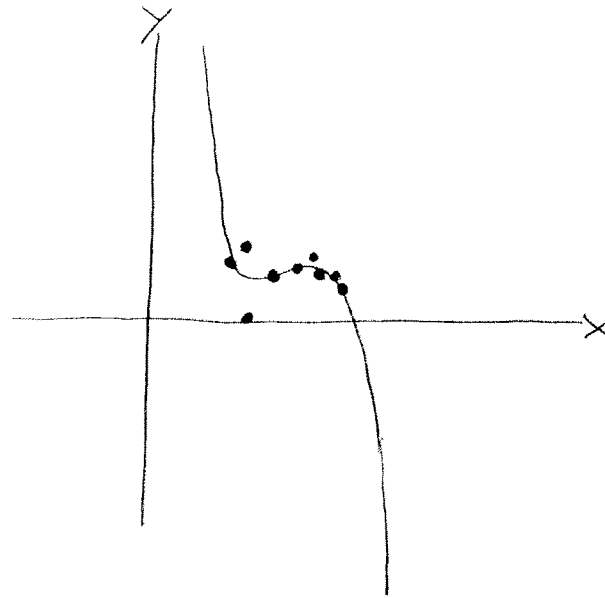
4 factors / + coeff.  
 4 zeroes: 2 real, 2i  
 (23.46..., -3.14..., (x+3.14..., (x-23.46...,

At -3.14 + 23.46 years old you'd be 0 inches tall.

GROUP NAME:	Student Names (First and Last)
Logo:	Speaker/Presenter: <u>Natalie Castillo</u>
Date: <u>9-11-2013</u>	Writer/Prep: <u>LAUREN DOES</u>
Topics: <u>CAMERA SALES</u> <u>COMPLEX NUMBERS AND ZEROS</u>	QC/Leader: _____

Instructions: FIND ZEROS ON A CUBIC REGRESSION

X	Y
YEAR	PRICE
2006	5.172
2007	6.952
2008	7.920
2009	4.287
2010	5.082
2011	6.294
2012	4.967
2013	6.129
2014	5.238



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

$a = -55.26346801$   
 $b = 1717.923521$   
 $c = -16991.45443$   
 $d = 57475.86364$

FACES: 3

ZEROS: 3 → 1 REAL  
2 COMPLEX

LEADING COEFFICIENT: -55.

IN 2016, THERE WILL BE NO SALES.