146 d15

Precalculus – Study of Functions

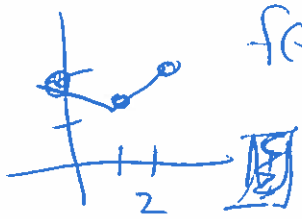
"Job"

Input = Domain

Output = Range

Data | Graphs | Equats

x	y
1	2
3	4



$f(x) = \sqrt{x}$

$x \geq 0$

- Polynomials (Degree, Lead)
  - End Behavior
  - Zeros – Intercepts, complex
  - Faces
  - Touched / Passed Thru
  - Factors.

Domain: {1, 3}

Range: {2, 4}

Domain: [0, 2]

Range: [1, 2]

Domain: $[0, \infty)$

Range: $[0, \infty)$

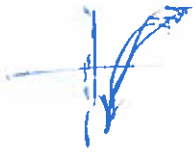
- Rationals
  - Vertical Asymptote
  - H.A, Slant A,
  - Volcanos, Heartbeats

- Exponents
  - Growth / Decay
  - HA $y = 0$.
  - Compound Interest / Continuously (Compounding)
  - "e" ≈ 2.71 Natural Exponent $P = Q e^{RT}$

Double Time

Half Lifes

Logs.



- VA $x=0$
- 5 properties of logs
-

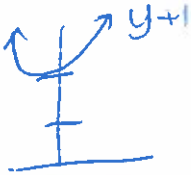
Transformations.

$f(x)+A$ Raise by A

x	y
1	2
3	4

$f(x)$

x	y+1
1	3
3	5



$f(x)+1$

$B\,f(x)$ B - stretch, shrink, reflect

x	2y
1	4
3	0

$2f(x)$

$f(x+C)$ $+C$ - left or $-C$ - Right

x	f(x+3)
-2	2
0	4

$f(x+3)$

$3f(x+4)-7$

1. Left by 4
2. Stretch by 3
3. down 7

In order

1. C
2. B
3. A

Inverse f^{-1}

- Horizontal Line Test
- Find — ① Solve for x
  ② switch x & y
  ③ y^{-1} for y

x	y
1	2
3	4

x	y^{-1}
2	1
4	3

- $(f \circ f^{-1})(x) =$
- $(f^{-1} \circ f)(x) =$

$y(1)$	
$y^{-1}(2)$	$y^{-1}(y(1))$
1	$(y^{-1} \circ y)(1)$

$\log_{10} x$ is inverse of 10^x

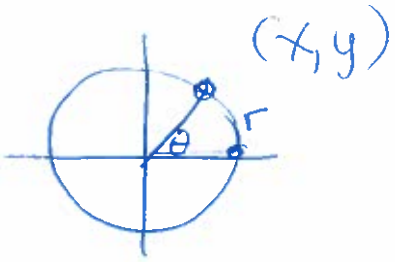
$$\log_B B^x = x$$

$$B^{\log_B x} = x$$

Evaluate at $x = 3$ or Solve $f(x) = 3$

$f(3) = ?$ ↓ $x = ?$

TRIG FUNCTIONS



$x^2 + y^2 = 1$

$W(\theta) = (x, y)$

$W(0^\circ) = (1, 0)$

$W(45^\circ) = \left(\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}\right)$

$\left(\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2}\right)$

$W(90^\circ) = (0, 1)$

↑

Domain = Degrees

Domain = Radians

$W(r) = (x, y)$

$W(0) = (1, 0)$

$W\left(\frac{\pi}{4}\right) = \left(\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}\right)$

(45°)

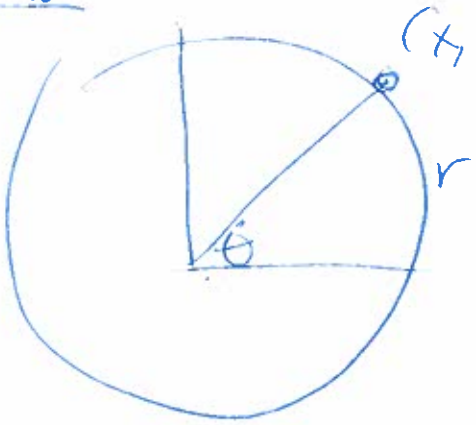
$W(\pi) = (-1, 0)$

Reciprocal Function

$y = \sin(\theta)$ $\quad \csc(\theta) = \frac{1}{y}$

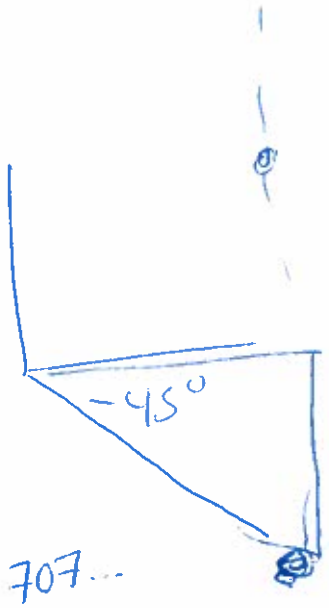
$x = \cos(\theta)$ $\quad \sec(\theta) = \frac{1}{x}$

$\frac{y}{x} = \tan(\theta)$ $\quad \cot(\theta) = \frac{x}{y}$



$\sin^{-1}(\theta)$ ← inverse sine

$\frac{1}{\sin(\theta)} \equiv \csc(\theta)$



$\sin(-45^\circ) = -\frac{1}{\sqrt{2}}$ or $-\frac{\sqrt{2}}{2}$ or $-.707\ldots$

$\cos(-45^\circ) = \frac{1}{\sqrt{2}}$ or $\frac{\sqrt{2}}{2}$ or $.707$ $\quad \left(\frac{1}{\sqrt{2}}, \frac{-1}{\sqrt{2}}\right)$

$\tan(-45^\circ) = -1$

$1/\cos(-45^\circ) = \sec(-45^\circ) = \sqrt{2}$ or $1.414\ldots$

$\csc(-45^\circ) = -\sqrt{2}$ or -1.414

$\cot(-45^\circ) = -1$

$$y = A\sin(Bx + C) + D$$

- A: Shrink / Stretch
- B: Smush / pull
- C: Left / Right
- D: Raise / Lower

$y = \sin(x)$

$f(x) = \sin(x)$

Domain: $(-\infty, \infty)$

Range: $[-1, 1]$

$\sin(0) = 0$

GROUP NAME: We love science

Date: 3-25-14

Student Names (First and Last)

Speaker/Presenter: _____

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

Dependant Variable (y-axis): # cupcakes

Writer/Prep: Marta Truszkowska

Leader/Collaborator: Yvette Aguilar

Conclusion (in words): In 62 min we can make a 100 cupcakes

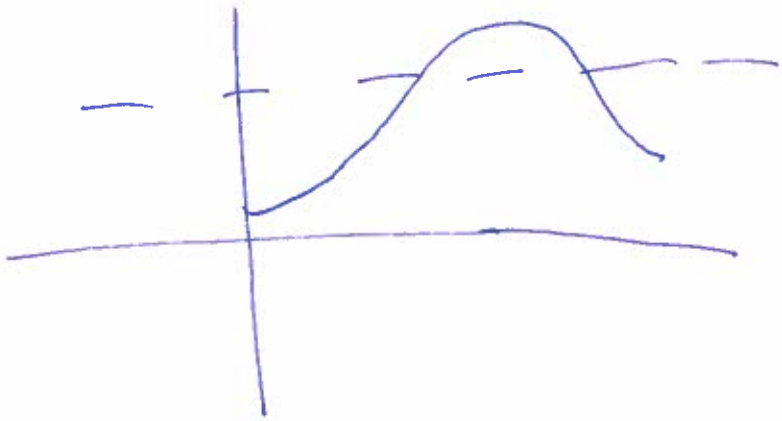
Supporting Work:

x	y
24	24
35	48
47	72
67	96
78	120

stat edit

stat (calc) sin Reg

$y = 41.263 \sin(.0581x + -2.796) + 70.83$



GROUP NAME: group 3.

Date: March 25, 2014

Student Names (First and Last)

Speaker/Presenter: _____

Writer/Prep: Blake Biondo

Leader/Collaborator: Kevin Leonardi

Independant Variable (x-axis): year

Dependant Variable (y-axis): Populahon NJ.

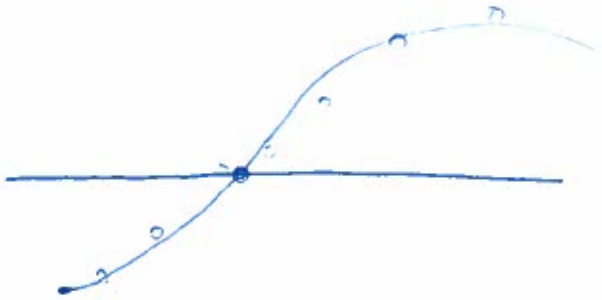
Conclusion (in words):
in 1973 New Jersey populalis is going tobe 7M.

Supporting Work:

x	y
1930	4 (million)
1940	4,1
	4,3
	6
	7,1
	7,3
	7
	6
	7

$y = 2.2920 \cdot \sin(.039267(x) + (-1.7586) + 6.1951$

a = 2.292
b = 0.392467
c = -1.758613
d = 6.19509



intersection : 1973.9204
y = 7

GROUP NAME: This Group, Best Group

Date: 3/25/14

Student Names (First and Last)

Speaker/Presenter: Jesse Achmann

Writer/Prep: Billy Rafferty

Leader/Collaborator: Stephen Burns

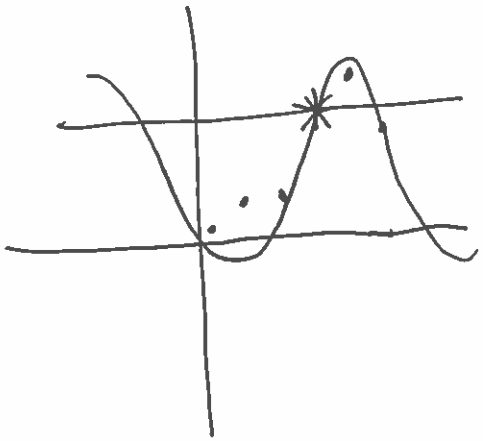
Independant Variable (x-axis): Time in Months

Dependant Variable (y-axis): Price of Bitcoins

Conclusion (in words): Bitcoins will be worth $2000 at 9.057 months

Supporting Work:

X	y
1	$4.90
4	$308.51
7	$332.44
10	$3151.9
13	$2116.9



Sin Reg

$1344.635... \sin(.413...x + -2.969...) + 1062.638...$

GROUP NAME: Team chem

Date: 03/25/14

Student Names (First and Last)

Speaker/Presenter: [illegible]

Writer/Prep: Joey Stevens

Leader/Collaborator: Eli Simpson

Independant Variable (x-axis): _____

Dependant Variable (y-axis): _____

Conclusion (in words):

Selling 1-hits by our 9th month we will be making 15K, showing our Sin regression of revenue

Supporting Work:

L1	L2
5	5
6	6
7	9
8	11
9	15

for each given year

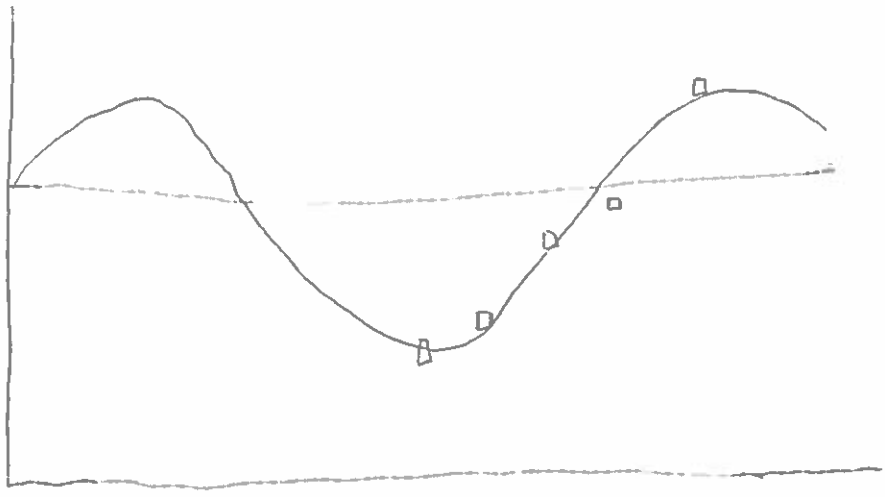
$y = a \cdot \sin(bx + c) + d$

$a = 4.731908659$

$b = .7853981634$

$c = -.4792236711$

$d = 9.888659274$



Intersection $x = 2.8009526$, $Y = 12$

GROUP NAME: W/ Lawrence

Date: 3-25-14

Student Names (First and Last)

Speaker/Presenter: Li Tang Lin

Writer/Prep: Craig S

Leader/Collaborator: Zach Labonte

Independant Variable (x-axis): Time (Years)

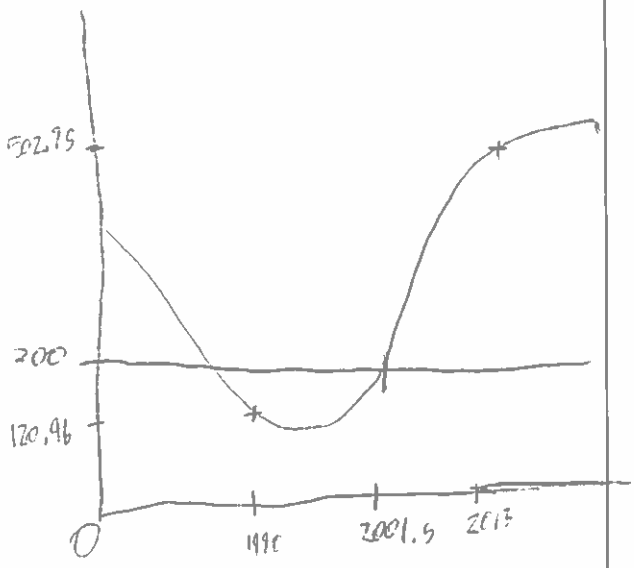
Dependant Variable (y-axis): GDP of Poland (Billions of USD)

Conclusion (in words): In 2015, the GDP of Poland will be 520.48 billion USD.
In 2001, the GDP of Poland will reach 200 billion

Supporting Work:

X	Y
1990	82.2
1991	64.5
1993	92.3
1995	108.4
1997	150.7
1999	172.9
2001	171.3
2002	190.4
2004	216.8
2006	303.9
2008	425.3
2009	529.4
2010	430.1
2011	469.7
2013	489.8

$y = 218.24 \cdot \sin(.1428x + 2.713) + 304.480$



$520.48 = 218.24 \cdot \sin(.1428(2015) + 2.713) + 304.480$

MATH JEDIS

GROUP NAME:

Date:_____

Student Names (First and Last)

Speaker/Presenter: Paul Klos

Writer/Prep: Ricky

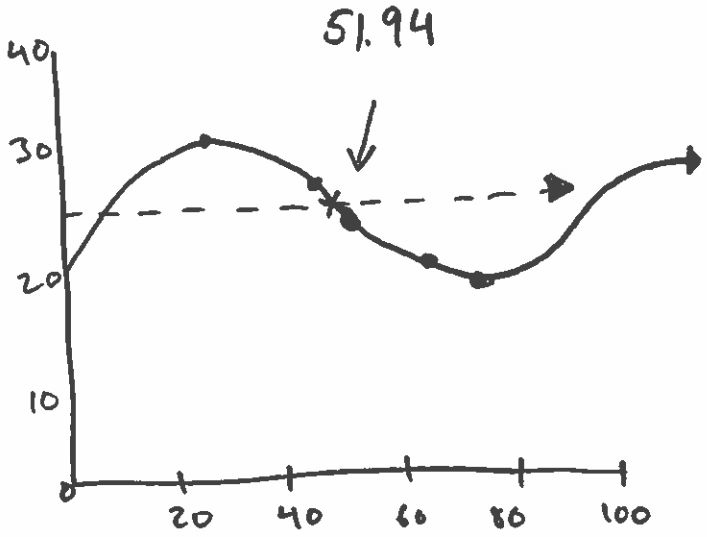
Leader/Collaborator: Byron

Independant Variable (x-axis): miles per hours

Dependant Variable (y-axis): miles per gallon

Conclusion (in words): If you travel 51.94 miles per hour you will get 25 miles per ~~hour~~ gallon

Supporting Work:



L1	L2
25	30
45	28
50	25
65	21
70	19

8h regression

Stat → C: Enter

L1, L2, 140

Y= Vars 5: → → 1:

Calculate intersects

2nd Trace 5:

first curve: 52.2

Second curve: 52.5

Guess = 52.00

x=51.945 y=25

Precalculus Invaders

GROUP NAME:

Date: 5/5/2014

Student Names (First and Last)

Speaker/Presenter: Zoltan [illegible]

Writer/Prep: Dwight Howard's

Leader/Collaborator: Alina [illegible]

Independant Variable (x-axis): years

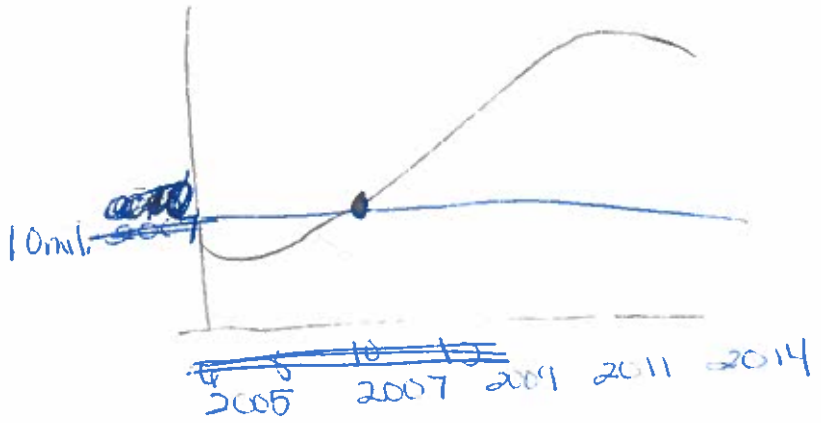
Dependant Variable (y-axis): [illegible]

Conclusion (in words): ~~[illegible] in 2007 [illegible] New York was~~ 11.520

In 2007.222 the population is 10million

Supporting Work:

X = yr [illegible]
y = [illegible]



X	y
	8
	9
	13
	14
2015	15

Intersection
2007 population in New York was 10 million.

y = a^x sin(bx + c) + d
a = 2007.222
b = -.0676305885
c = -.5611165917
d = 11.44185988

GROUP NAME: Math Lovers

Date: 3/25/14

Student Names (First and Last)

Speaker/Presenter: Gilfort

Writer/Prep: karthik

Leader/Collaborator: Noor cheema

Independant Variable (x-axis): cost of watch

Dependant Variable (y-axis): # of watch's suld

Conclusion (in words):

For $150.81, we can sell upto 65 watch

Supporting Work:

X	Y
110	80
120	70
150	65
170	150
180	38
190	25

Sine Regression

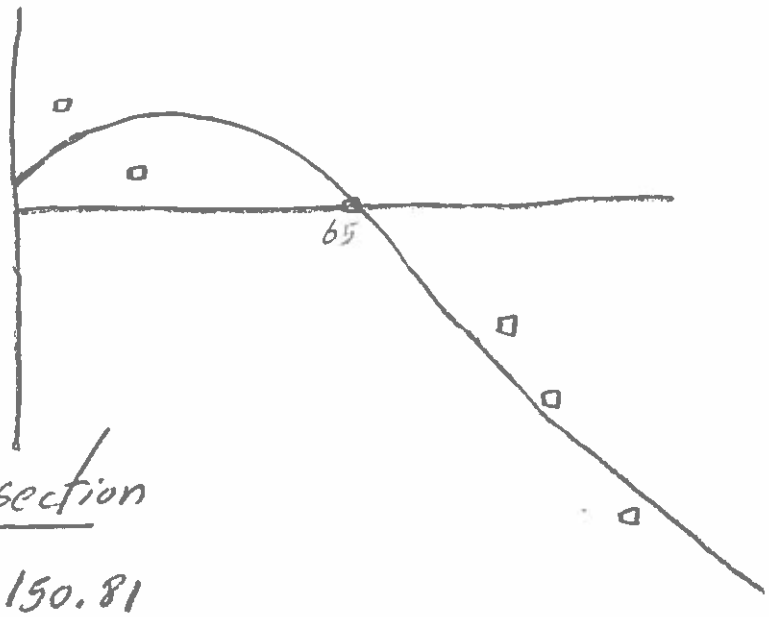
$Y = a * \sin(bx + c) + d$

$a = 26.30$

$b = .039$

$C = 2.95$

$d = 51.34$



Intersection

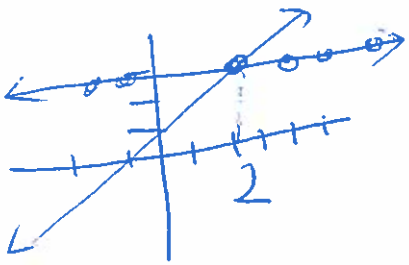
$X = 150.81$

$Y = 65$

Solving Equations

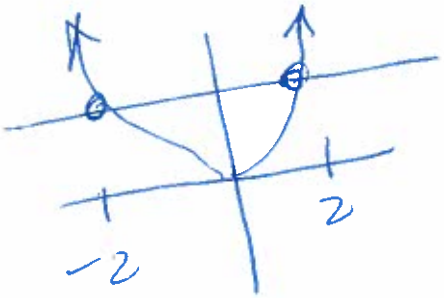
Ex $x + 1 = 3$

$f(x) = x + 1 \quad g(x) = 3$



Intersection Method

Ex $x^2 = 4$



$Y_1 = x^2$

$Y_2 = 4$

Calc 5: Intersect

1st Curve: Y_1 Cente

2nd Curve: Y_2 Cente

Guess: (0) Cente

$X = 2$

Calc 5: Intersect

1st Curve: Y_1

2nd Curve: Y_2

Guess: (-3)

$X = -2$

Y_1 = Sine regress

Sinreg 1, L_1, L_2, $\frac{\text{Ɛ}}{\text{Period}}$

= 2 (X_{max} − X_{min})

$Y_2 = 12$

Calc 5: intersect

<enter> <enter> <enter> <enter>

$X = 7.987$

"In 2008 Lady 6 rescues 12 million by sinreg."

TO Solve

(1) by Hand (2) Intersect method

(3) Solver