Agenda

Review Quiz 4 and Exam 1

Lecture: Exponentials

Lecture: Transformations of Functions

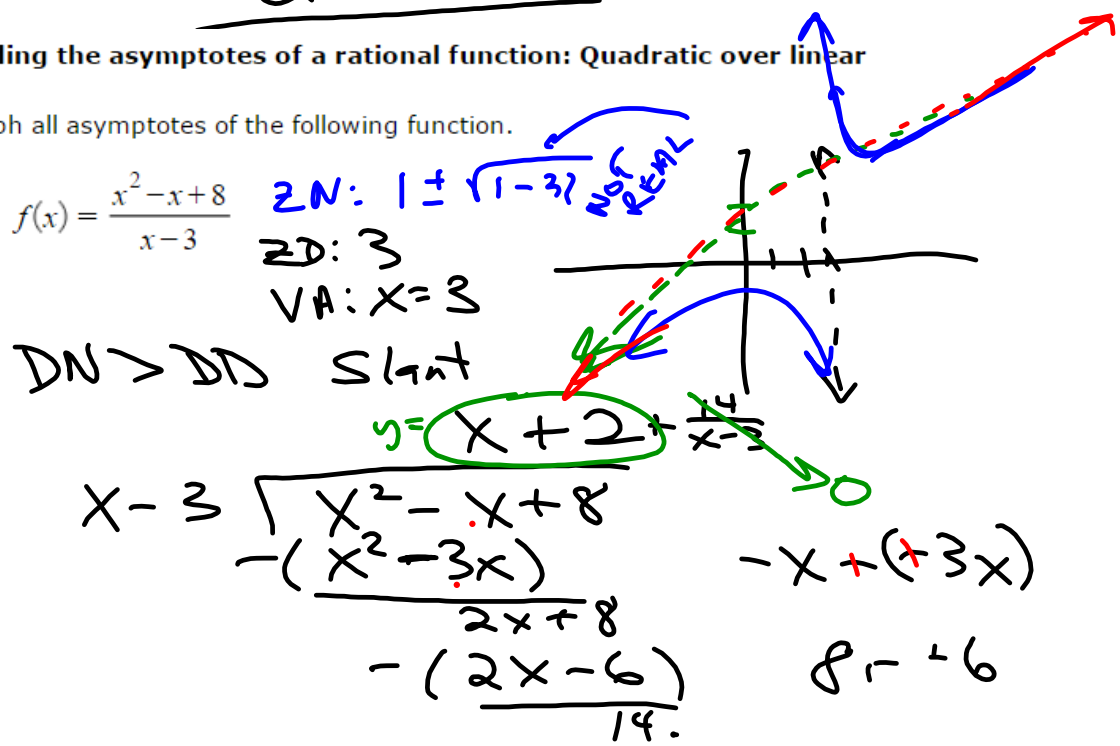
Project: Exponential Function

Quiz 4

Finding the asymptotes of a rational function: Quadratic over linear

Graph all asymptotes of the following function.

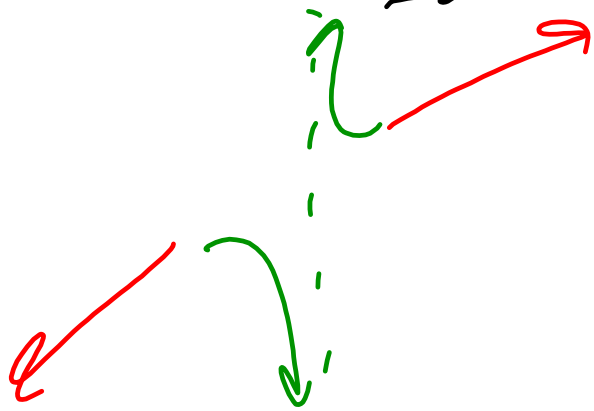
$$f(x)=\frac{x^2-x+8}{x-3}$$

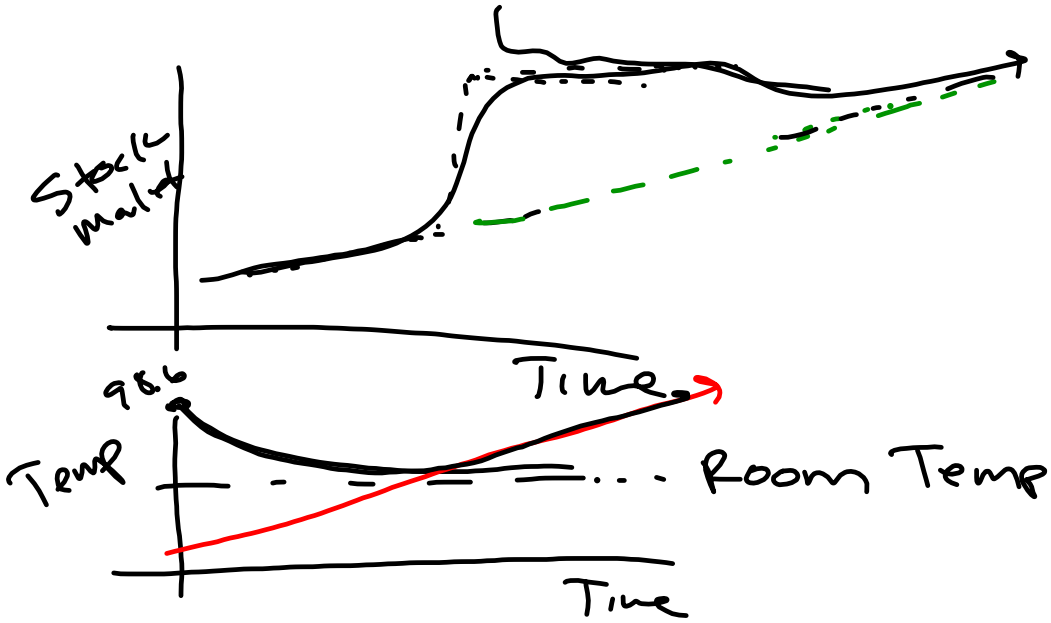


3/2 Improper | 1 1/2 Mix.

$$\frac{x^2 - x + 8}{x - 3} = x + 2 + \frac{14}{x - 3}$$

When x is huge





Solve the following inequality.

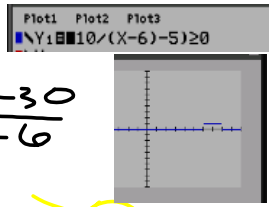
$\frac{10}{x-6} \geq 5$

$\frac{10}{x-6} - 5 \geq 0$

$y = \frac{10}{x-6} - 5$

$= \frac{10}{x-6} - \frac{5x-30}{x-6}$

$y = \frac{40-5x}{(x-6)} \geq 0$ LAND



ZN: 8 (XINT)

ZD: 6

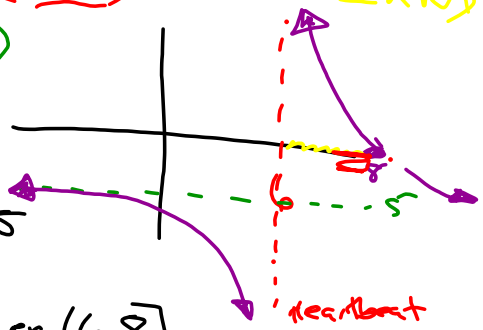
VA: X = 6

HA: DN=DD

LN = −5

LD = 1

HA: y = −5



Answer (6, 8]

Not Answer (water)

$(-\infty, 6) \cup [8, \infty)$

$y \leq 0$

Solve the following inequality.

$\frac{x+5}{x-1} \leq 0$

$y = \frac{X+5}{(X-1)} \leq 0$ Water

HA: DN = DD

$y = \frac{LN}{LD} = \frac{1}{1}$

Write your answer using interval notation.

Your answer:

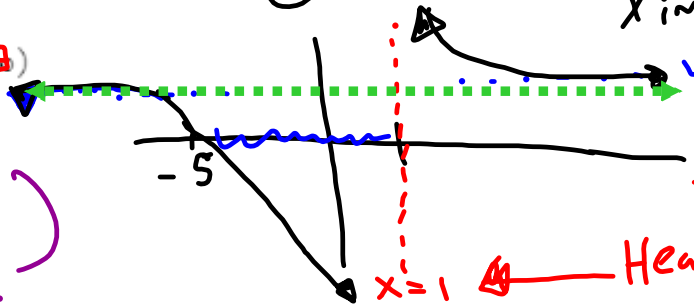
~~(−∞, −5] ∪ [1, ∞)~~

Graph

XINT (ZN): −5

Pass

y = 1



ZD: 1

Heartbeat

[−5, 1)

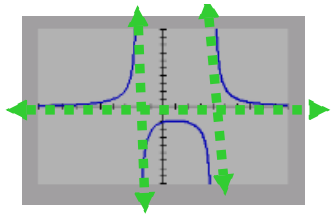
count shore.

Graphing a rational function with more than one vertical asymptote

Graph the following rational function.

$$f(x)=\frac{16}{x^2-2x-8} = \frac{16}{(x-4)(x+2)}$$

2N: None

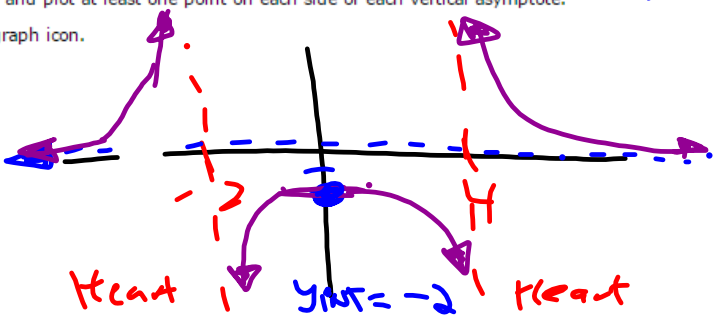


DD > DN

HA: $y=0$

To graph the function, draw the horizontal and vertical asymptotes (if any), plot the intercepts (if any), and plot at least one point on each side of each vertical asymptote.

Then click on the graph icon.



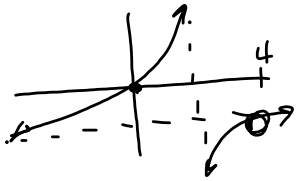
Hcant Hcant

$y_{int}(x=0): \frac{16}{-8} = -2$

Graphing rational functions with holes

Graph the rational function $f(x)=\frac{-2x^2+8x}{x^2-6x+8}$.

$$= \frac{-2x(x-4)}{(x-2)(x-4)}$$

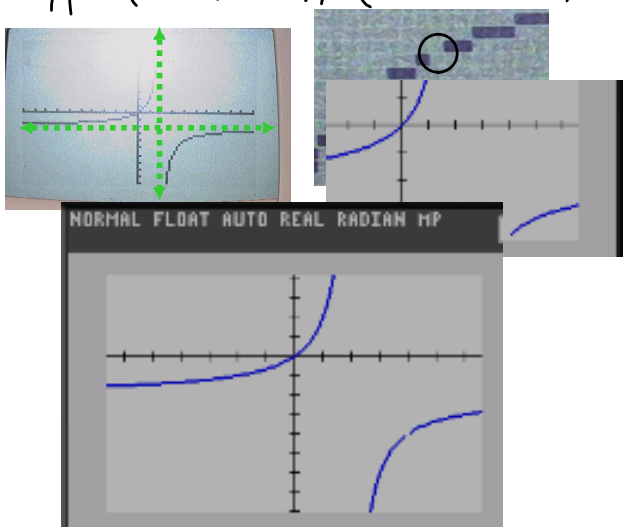


$x \neq 4$

At $x=4$

Hole

$Y_1 = (-2x^2+8x)/(x^2-6x+8)$



Zero	Factor
2	$x-2$
$3+i$	$x-(3+i)$
$3-i$	$x-(3-i)$

These factors give the following polynomial in factored form.

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

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

Note that this polynomial has degree 3.

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

We multiply the factors to get the answer.

$(x-2)[(x^2-6x+9)-i^2]$

$(x-2)(x^2-6x+10)$

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

$= (x-2)(x^2-6x+10)$ More

Lecture: Exponential Functions

$f(x) = B^x$

x ← exponent

B ← base

Interest Rate Formulas

Simple
$I = PRT$

I = interest
P = principal
R = rate
T = time

Compound Interest

P = Ending
Q = Starting Principle
R = Rate
N = Means..... Annual
T = Time

Interest	
Annual	$N = 1$
Quarterly	$N = 4$
monthly	$N = 12$
Daily	$N = 365$

$$P = Q\left(1 + \frac{R}{N}\right)^{NT}$$

$$= Q(1 + R/N) \wedge (N \cdot T)$$

$100 at .5% = 100.50

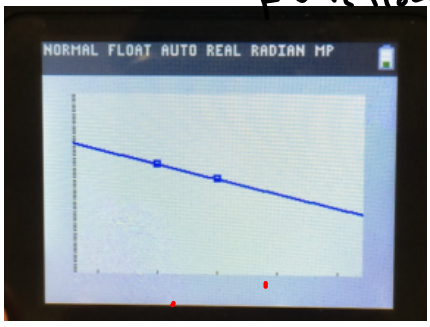
1 yr 100 (1.005) = 100.50

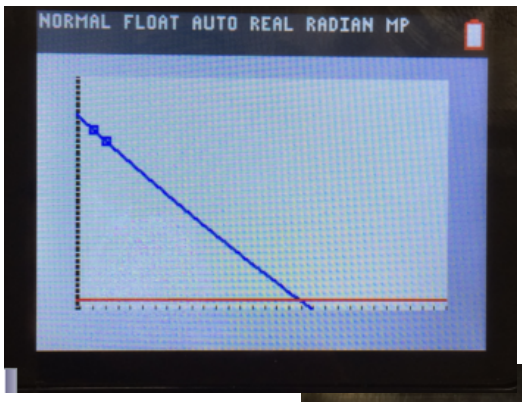
2 yr 100 (1.005)(1.005) = 101.0025

10 yr 100 $(1.005)^{10}$ = 105.114

100 yr 100 $(1.005)^{100}$ = 164.67

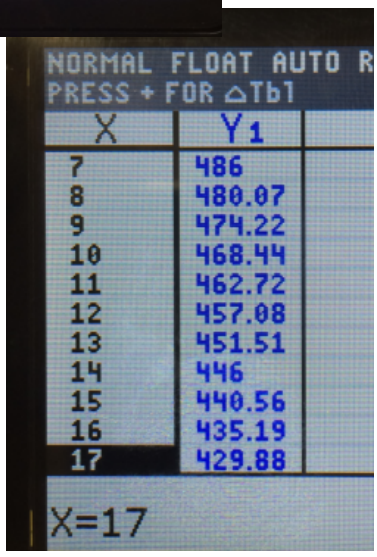
Exponential Functions





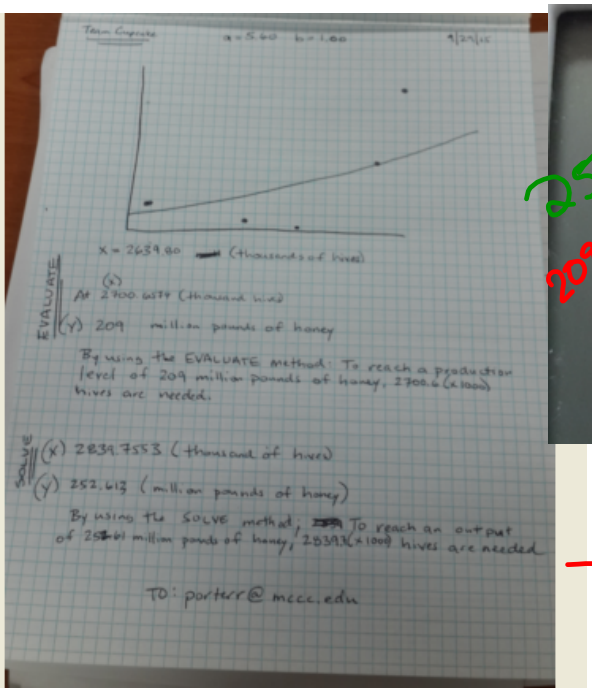
exponential decay

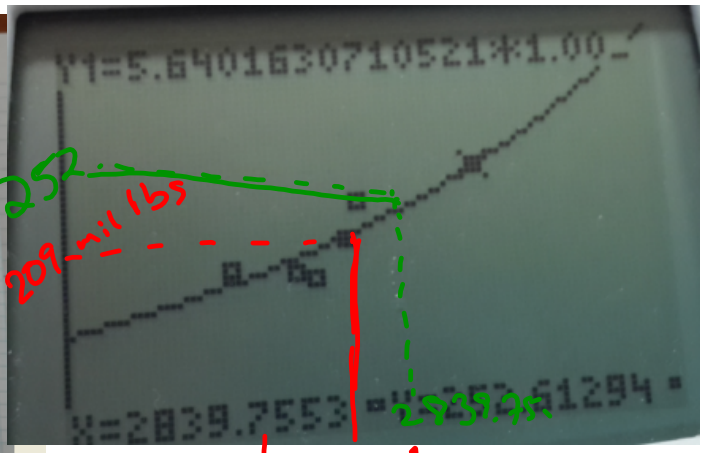
$y = A \cdot B^x$



School Board

In the year 2006 there were 492 recorded concussions and according to our regression there is a steady decrease leading to 400 concussions in the year 2023.



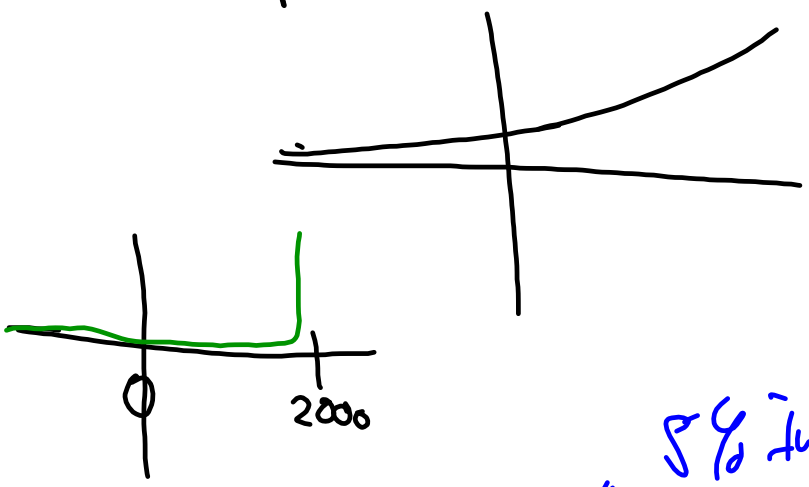


Exponential Growth

2700 Hives
Get 209 lbs

Evaluating
pick x → get y
Want y = 252 lbs
Solve
pick y → get x

Exponential Growth

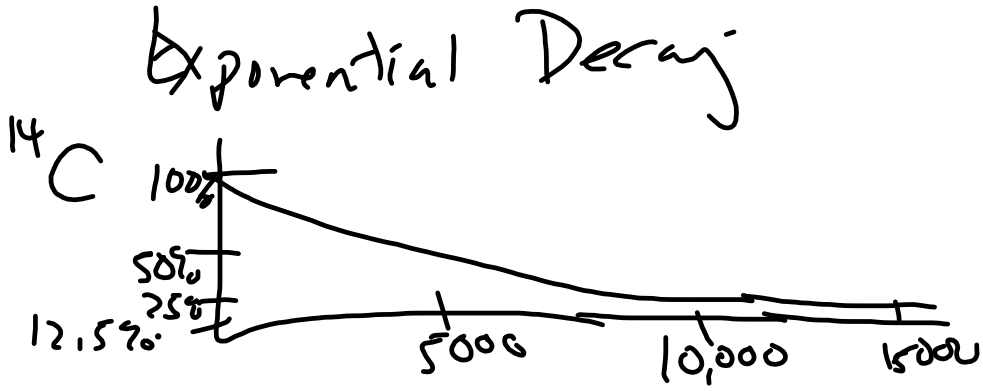


1.008

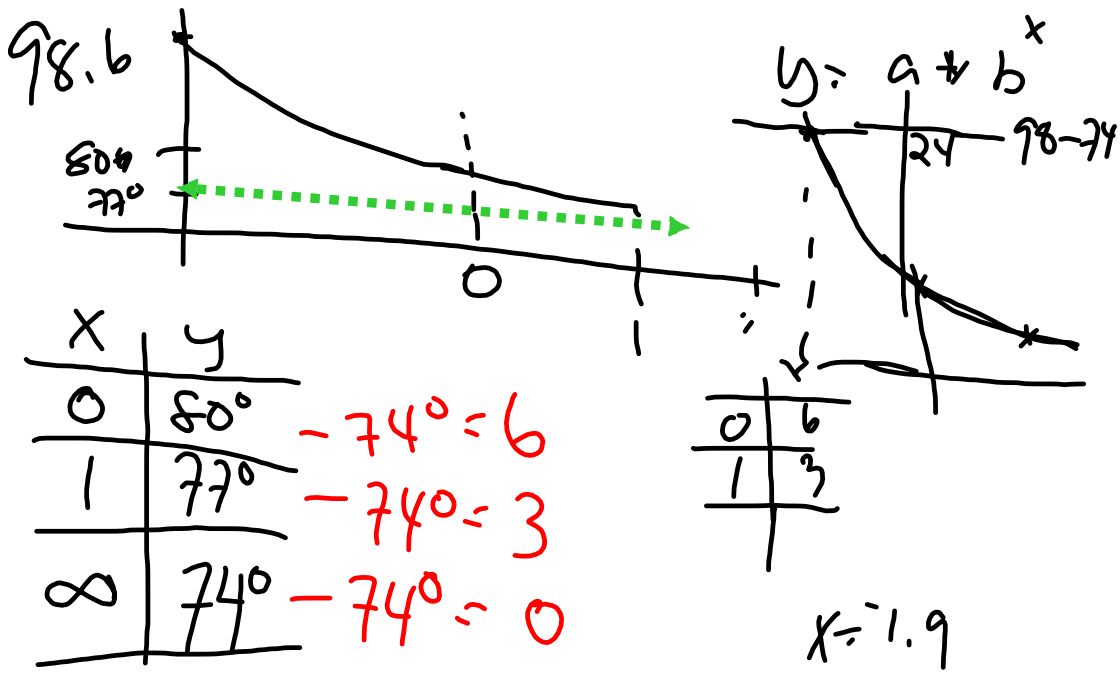
5% interest

$100(1.05) = $105

$100(1.05)^{13} = 200.$



carbon dating



Lecture : Transformation of Functions

Transformation of Functions

Person --------> Werewolf

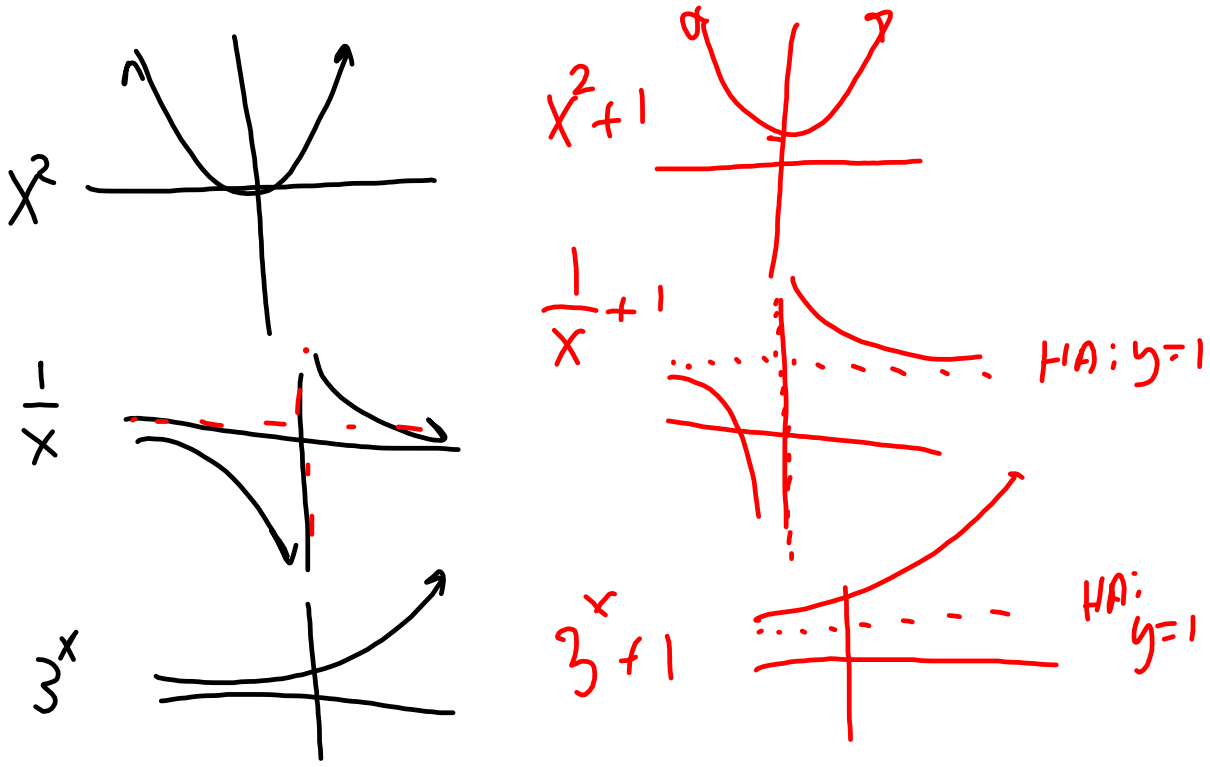
Parent Functions:

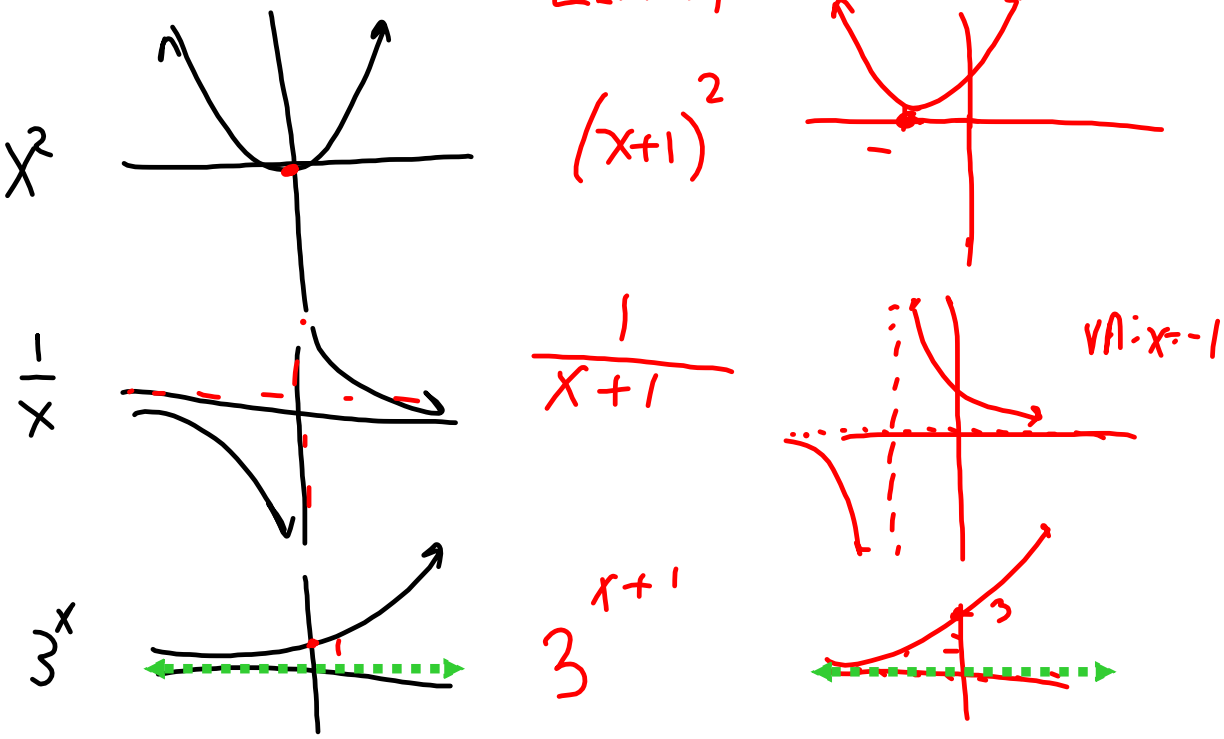
$f(x) = x^2$

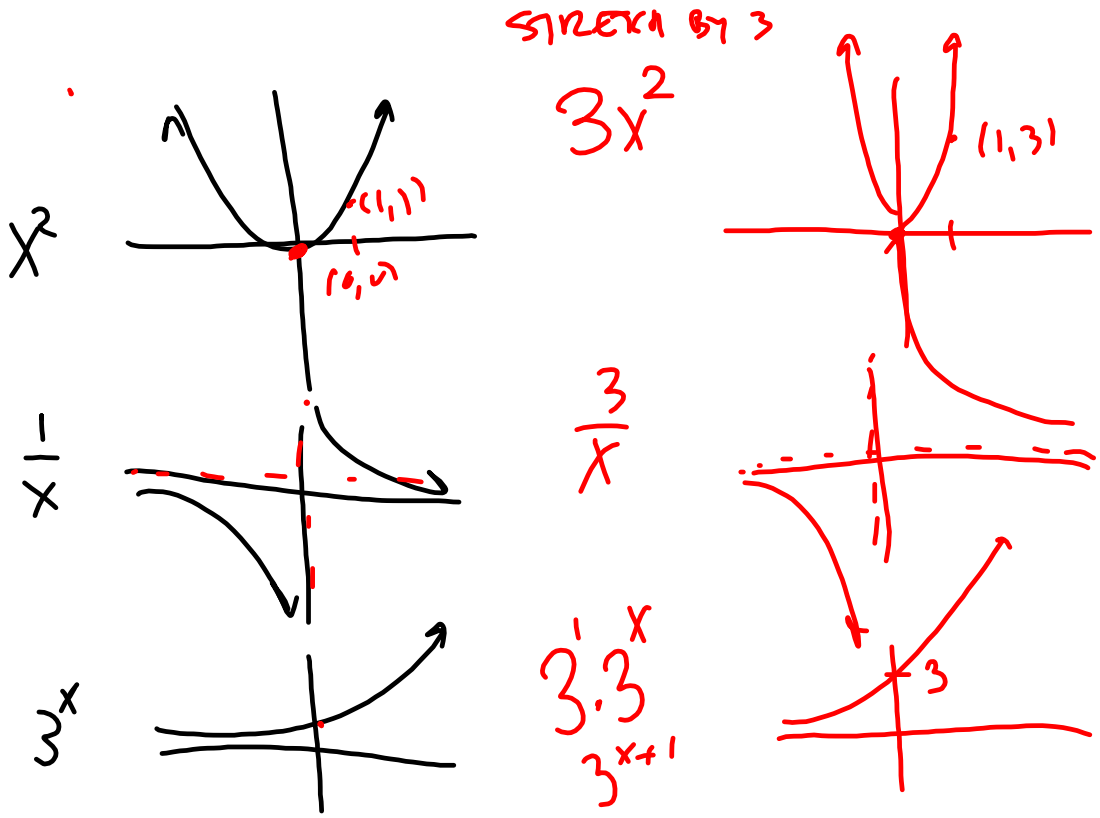
$g(x) = 1 / x$

$h(x) = 1.2^x$

	Inside	Outside
+	Left	Raise
−	Right	Lower
2, 3, 4.. X 1+	"Smush"	Stretch
1/2, 1/3, .9 X 1−	"Pull"	Shrink
−	Reflects y-axis	Reflects x-axis




Left by 1
x^2
$(x+1)^2$
$\frac{1}{x}$
$\frac{1}{x+1}$
VA: $x=-1$
3^x
3^{x+1}
3

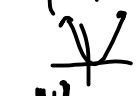

Stretch by 3
$3x^2$
x^2
(1,1)
(0,0)
(1,3)
$\frac{1}{x}$
$\frac{3}{x}$
3^x
$3 \cdot 3^x$
3^{x+1}
3

Ex $3(x-1)^2+7$ Vertex $(1,7)$

Graph: Parent: x^2

Order:

(PEMDAS) -1 Inside Right by 1

3 Outside Stretch 

7 Outside Up 7

3^x $3\cdot 3^{x-1}+7$

HA: $y=7$

natural exponent

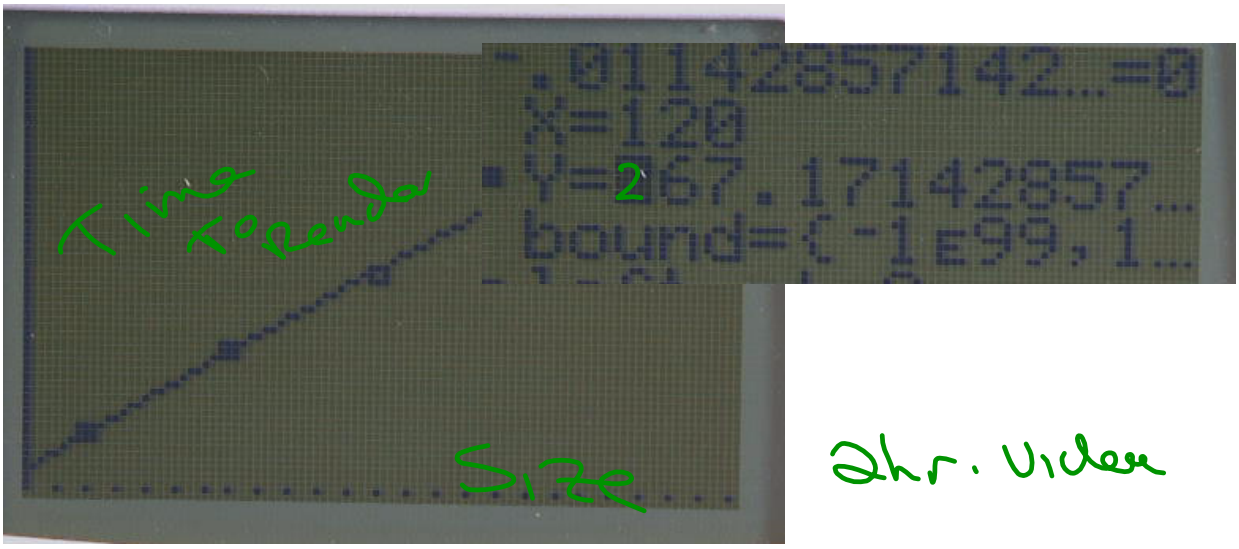
"e" $= 2.71\ldots$ (like π)

Formula

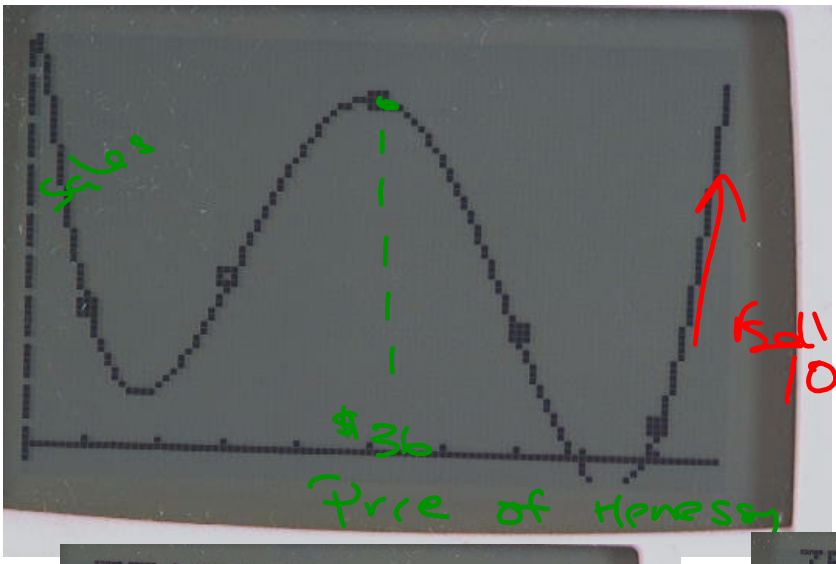
$P = Qe^{RT}$ (Compound Continuously $N=\infty$)

Project

Predict using Exponential regression

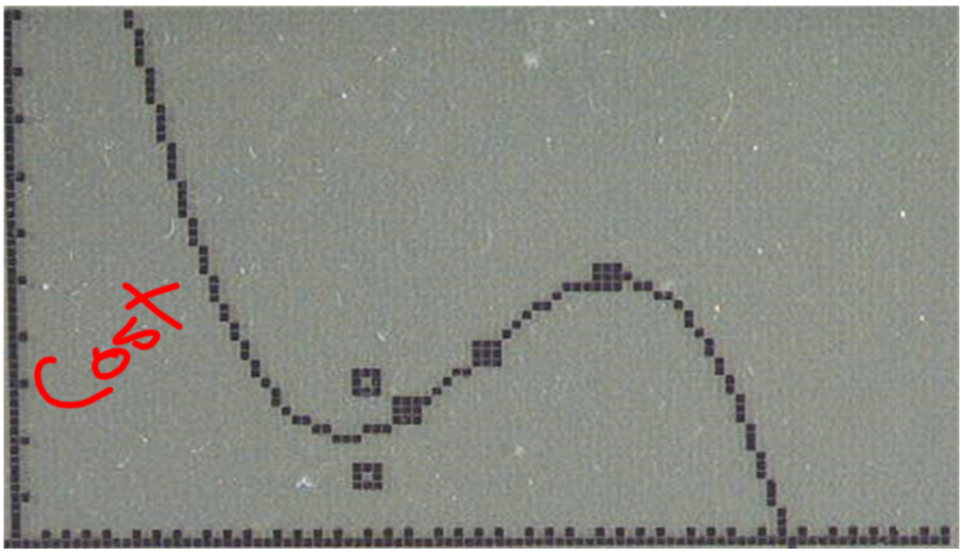


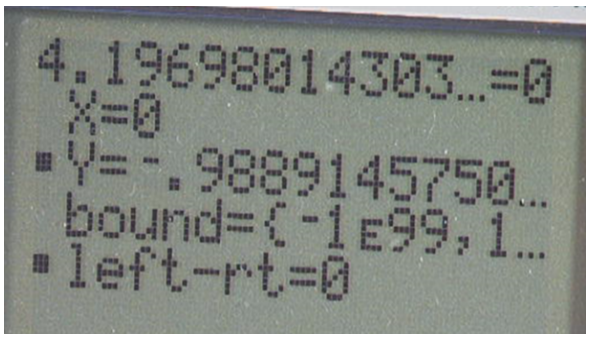
2hr. Video

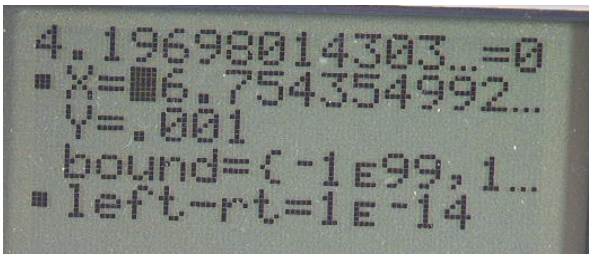


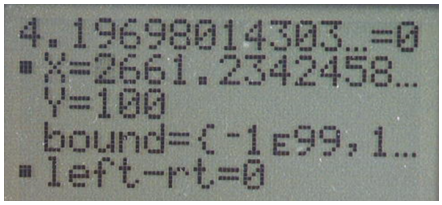
.35156250000...=0
X=31.81733138 9...
Y=100
bound={-1E99,1...
left-rt=-4E-8

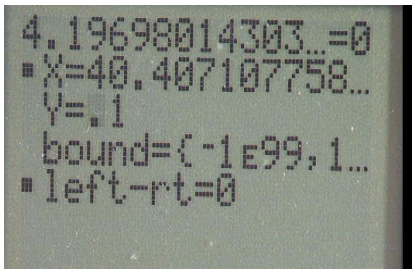
.35156250000...=0
X=42.33094436 7...
Y=100
bound={-1E99,1...
left-rt=6E-8

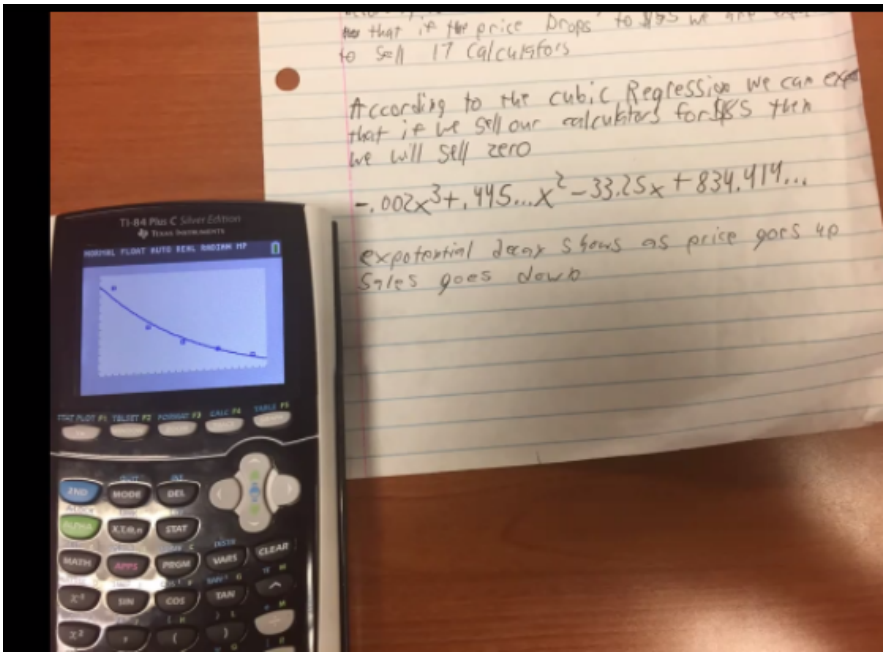



4.19698014303...=0
X=0
Y=-.988914575...
bound={-1E99,1...
left-rt=0


4.19698014303...=0
X=6.75435499...
Y=.001
bound={-1E99,1...
left-rt=1E-14


4.19698014303...=0
X=2661.2342458...
Y=100
bound={-1E99,1...
left-rt=0


4.19698014303...=0
X=40.407107758...
Y=.1
bound={-1E99,1...
left-rt=0


to sell 17 calculators
According to the cubic Regression we can
that if we sell our calculators for $95 then
we will sell zero
-.002x3+.445...x2-33.25x+834.414...
Exponential decay shows as price goes up
Sales goes down