

Quiz 4

Finding the asymptotes of a rational function: Quadratic over linear

Graph all asymptotes of the following function.

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

ZN: $1 \pm \sqrt{1-3}$ NOT REAL

ZD: 3

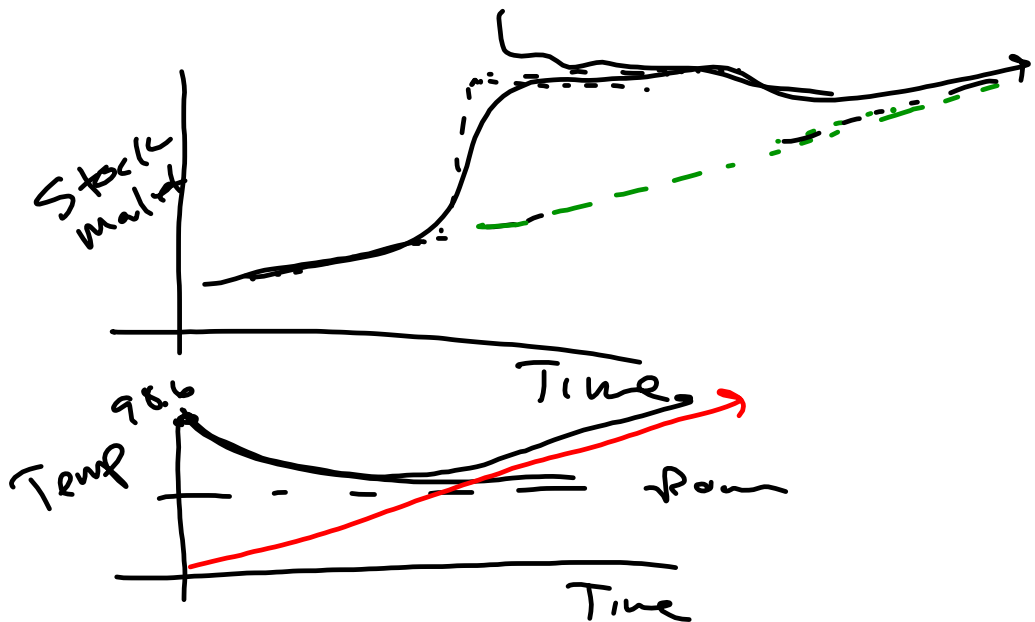
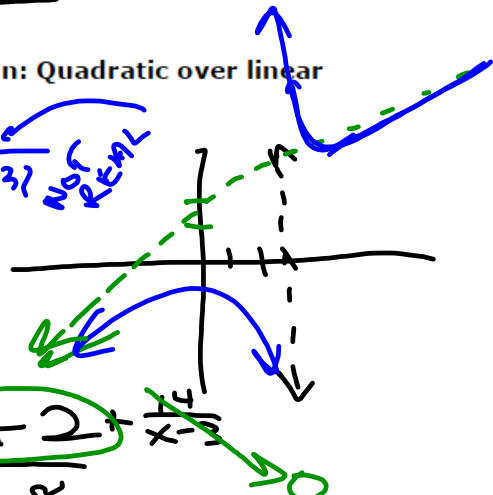
VA: $x = 3$

DN > DD Slant

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

$$\begin{array}{r} x-3 \overline{) x^2 - x + 8} \\ -(x^2 - 3x) \\ \hline 2x + 8 \\ -(2x - 6) \\ \hline 14 \end{array}$$

$-x + (+3x)$
 $r = +6$



Solve the following inequality.

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

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

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

$$y = \frac{40-5x}{(x-6)^2} \geq 0 \text{ (AND)}$$

ZN: 8 (x_{int})

ZD: 6

VA: X = 6

HA: DN=DD
LN = -5

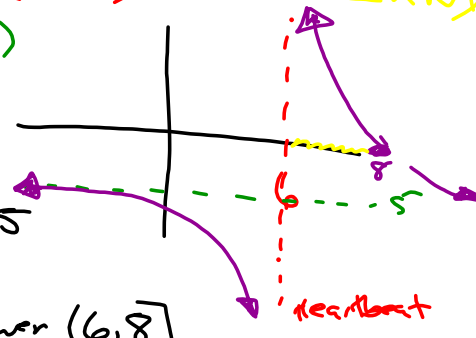
HA: y = -5

Answer (6, 8]

NOT Answer (water-)

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

$$y < 0$$



Solve the following inequality.

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

Write your answer using interval notation.

Your answer:

~~(-5, 1)~~

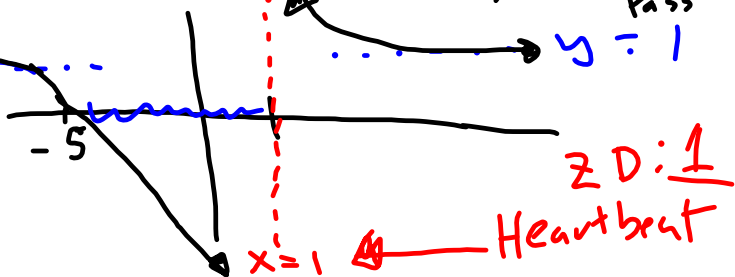
$[-5, 1)$
count share.

$$y = \frac{x+5}{(x-1)^2} \leq 0 \text{ (Water)}$$

HA: DN=DD
 $y = \frac{LN}{LD} = \frac{1}{1}$

Graph

x_{int} (ZN): 5
Pass



Graphing a rational function with more than one vertical asymptote

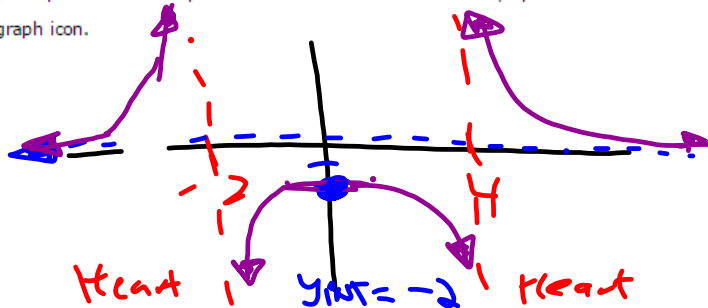
Graph the following rational function.

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

Z.N: None

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.



DD > DN
HA: y = 0

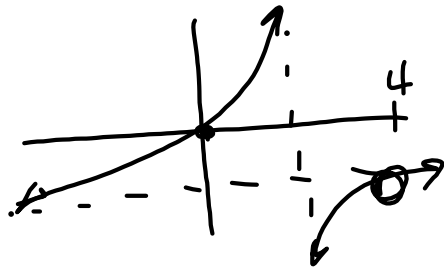
$$y_{int}(x=0) = \frac{16}{-8} = -2$$

Graphing rational functions with holes

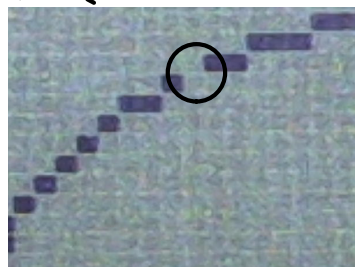
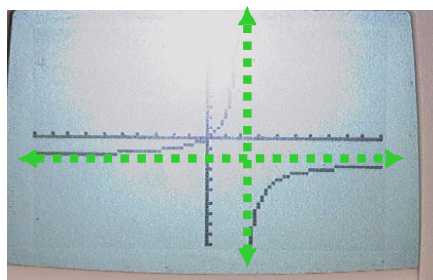
Graph the rational function $f(x) = \frac{-2x^2 + 8x}{x^2 - 6x + 8}$

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

$x \neq 4$
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.

We multiply the factors to get the answer.

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

$$(x-2) \left[(x-3+i)(x-3-i) \right]$$

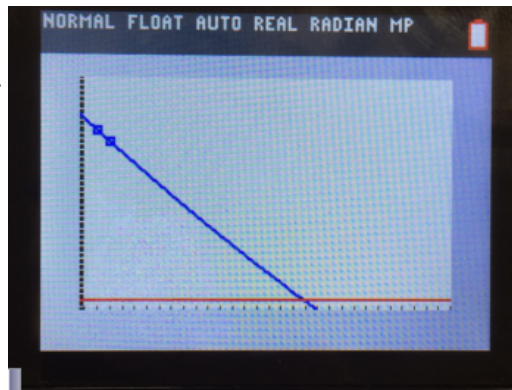
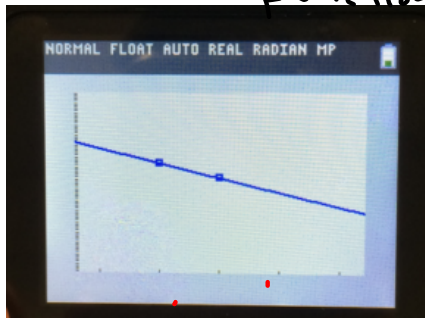
$$(x-2) \left[(x^2 - 6x + 9) - i^2 \right]$$

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

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

[More](#)

EXponential Functions



exponential decay

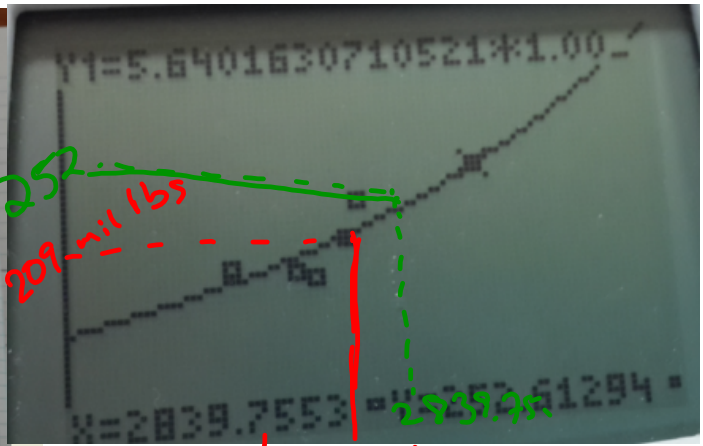
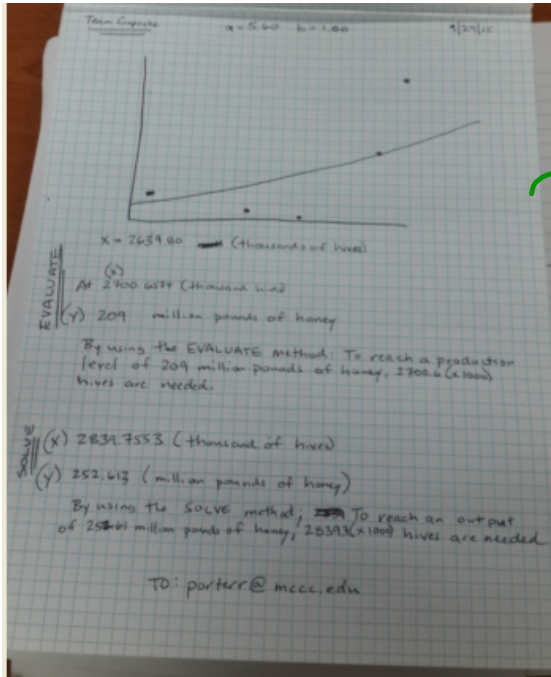
$$y = A \cdot B^x$$

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.

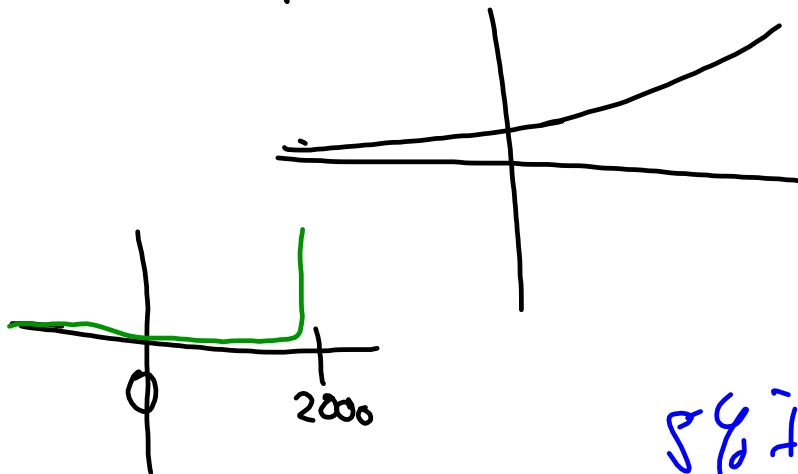
X	Y1
7	486
8	480.07
9	474.22
10	468.44
11	462.72
12	457.08
13	451.51
14	446
15	440.56
16	435.19
17	429.88

X=17



Exponential Growth | 2700 Hives
 Get 209 lbs
 Evaluating
 Pick X → get y
 Want y = 252 lbs
 Solve
 Pick y → get X

Exponential Growth



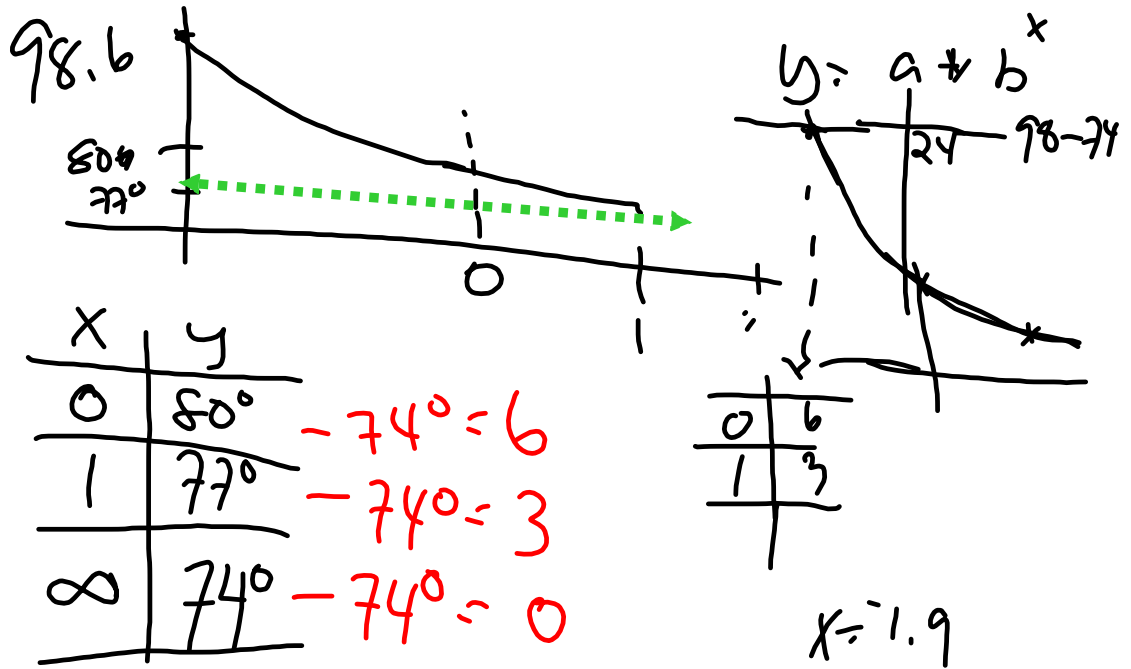
1.008

5% interest
 $\$100(1.05) = \105
 $100(1.05)^3 = 200.$

Exponential Decay



carbon dating



Transformation of Functions

Person -----> Werewolf

Parent Functions:

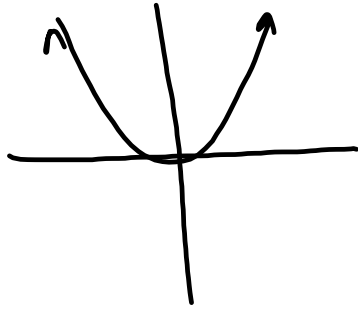
$$f(x) = x^2$$

$$g(x) = 1/x$$

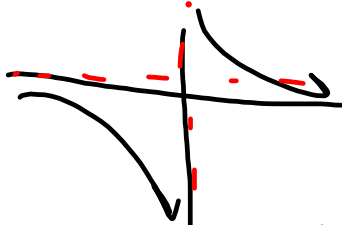
$$h(x) = 1.2^x$$

	Inside	Outside
+	Left	Raise
-	Right	Lower
$2, 3, 4 \dots \times ^+$	"Smush"	Stretch
$\frac{1}{2}, \frac{1}{3}, \dots \times ^-$	"Pull"	Shrink
-	Reflects y-axis	Reflects x-axis ☺

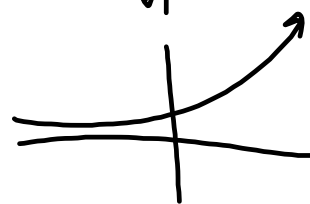
x^2



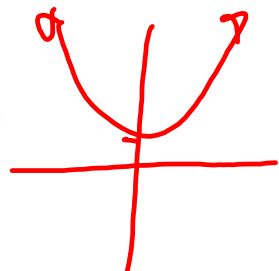
x^{-1}



3^x



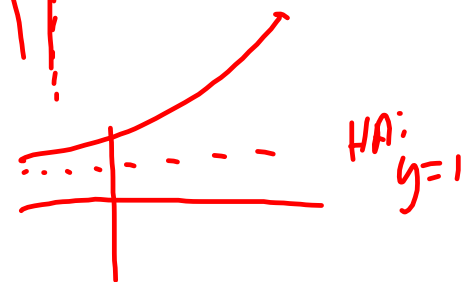
$x^2 + 1$



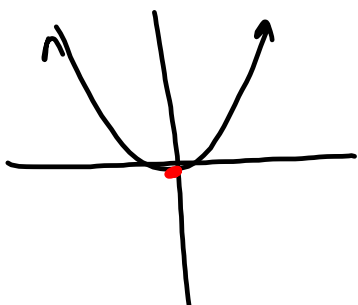
$\frac{1}{x} + 1$



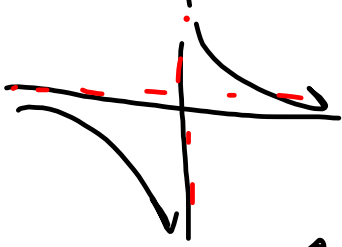
$3^x + 1$



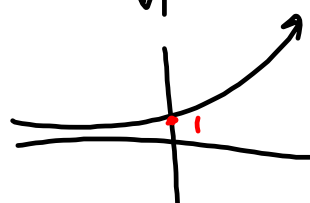
x^2



x^{-1}

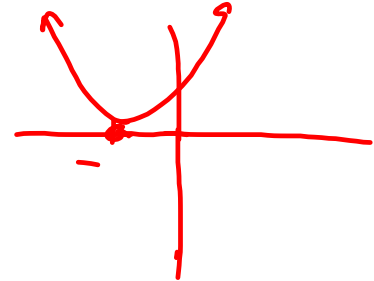


3^x

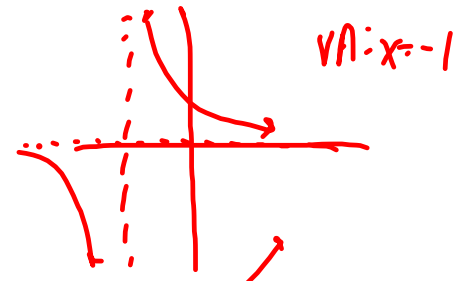


Left by 1

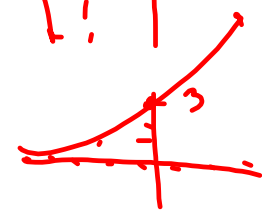
$(x+1)^2$

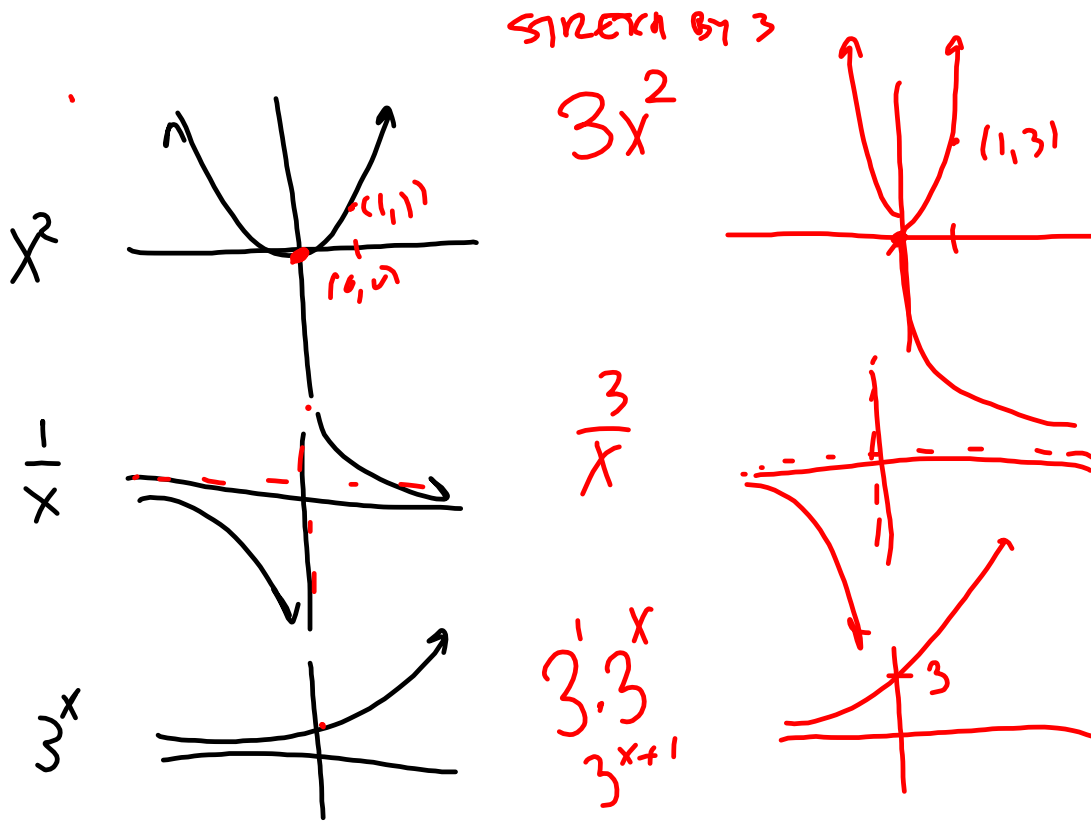


$\frac{1}{x+1}$



3^{x+1}





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

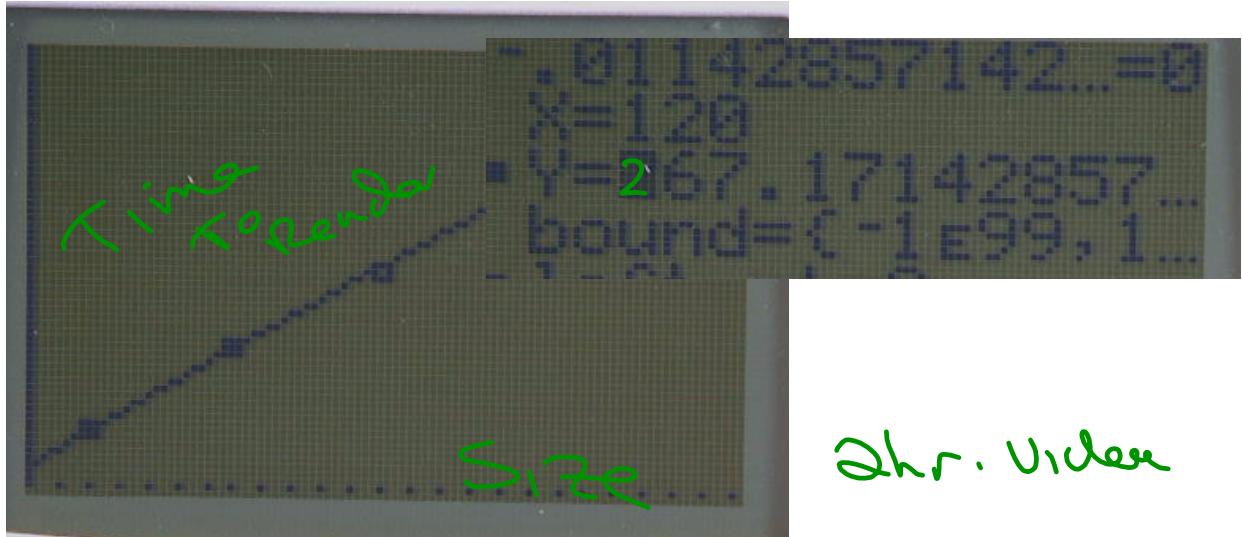
Graph: Parent: x^2

Order:

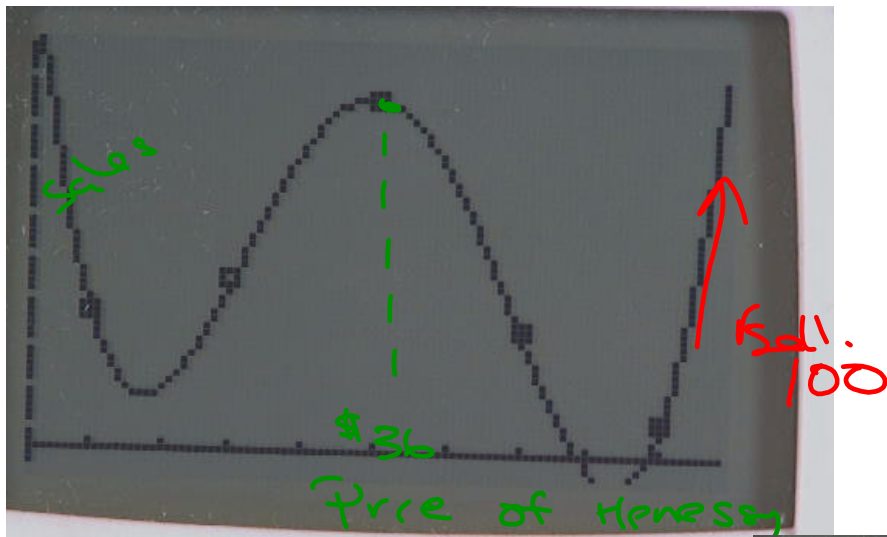
(PMDAS) - 1 Inside Right by 1
 3 Outside Stretch
 7 Outside Up 7

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

HA: $y=7$



2hr. Video



```

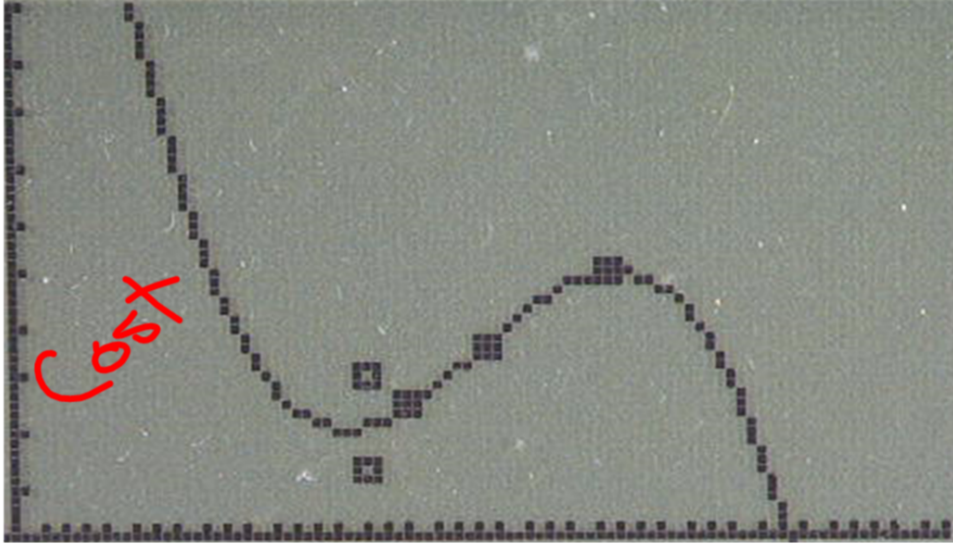
.351562500000..=0
X=31.817331389...
Y=100
bound={-1E99, 1...
left-rt=-4E-8

```

```

.351562500000..=0
X=42.330944367...
Y=100
bound={-1E99, 1...
left-rt=6E-8

```



Floors

```
4.19698014303...=0
X=0
▪ Y=-.9889145750...
bound=(-1E99, 1...
▪ left-rt=0
```

```
4.19698014303...=0
▪ X=6.754354992...
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
```

