Agenda

Homework Review

Lecture

Groupwork

Question # 3 Q#1 ALEKS

Union and intersection of intervals

The sets D and E are defined as follows.

$D = \{z \mid z \geq 4\}$

$E = \{z \mid z < 8\}$

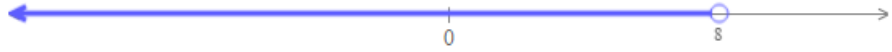
Write $D \cap E$ and $D \cup E$ using interval notation.
If the set is empty, write $\emptyset$.

"$\cap$" intersection [4, 8)

"$\cup$" Union $(-\infty, \infty)$

The set D is the interval $[4, \infty)$. It is graphed below.

The set E is the interval $(-\infty, 8)$. It is graphed below.



Q 6.

Determining a parameter to make a function continuous

Find a value of k such that the following function is continuous at all real numbers.

$$h(x) = \begin{cases} kx^2 - 3 & \text{if } x < -1 \\ 2x + 3 & \text{if } x \geq -1 \end{cases}$$

If there is no such value k, click on "None."

$\lim_{x \to -1^-} kx^2 - 3 = k - 3$

$\lim_{x \to -1^+} 2x + 3 = 1$

$k - 3 = 1$

$k = 4$

For $x < -1$, h is continuous because it acts as the quadratic function $kx^2 - 3$.
For $x \geq -1$, h is continuous because it acts as the linear function $2x + 3$.

More

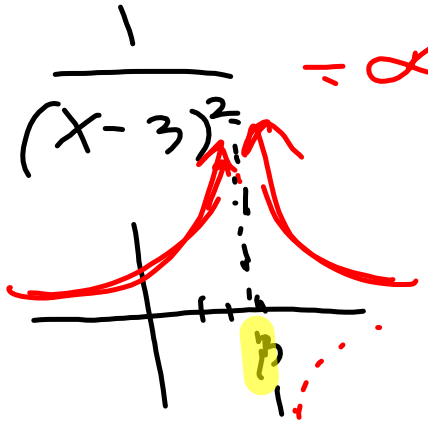
So, the only possible point of discontinuity for h is $x = -1$.
For h to be continuous at -1, we must have the following.

(1) h is defined at -1

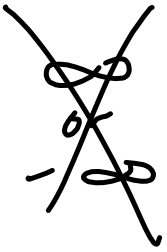
(2) $\lim_{x \to -1} h(x)$ exists

(3) $\lim_{x \to -1} h(x) = h(-1)$

$$\lim_{x \to 3} \frac{1}{(x-3)^2} = \infty$$



$$\lim_{x \to 3} \frac{1}{x-3} =$$



DNE

Finding a limit by using the limit laws: Problem type 3

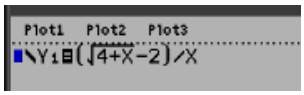
Find the following limit.

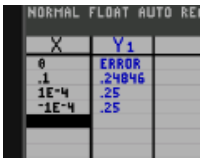
$$\lim_{h \to 0} \frac{\sqrt{4+h}-2}{h}$$

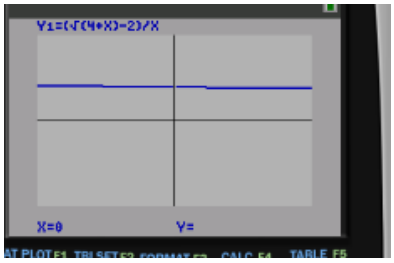
If the limit does not exist, click on "Does Not Exist."

$$\left(\frac{\sqrt{4+h}-2}{h}\right)\left(\frac{\sqrt{4+h}+2}{\sqrt{4+h}+2}\right) = \lim_{h \to 0} \frac{4+h-4}{h\left(\sqrt{4+h}+2\right)}$$

$$\lim_{h \to 0} \frac{1}{\sqrt{4+h}+2} = \frac{1}{4}$$

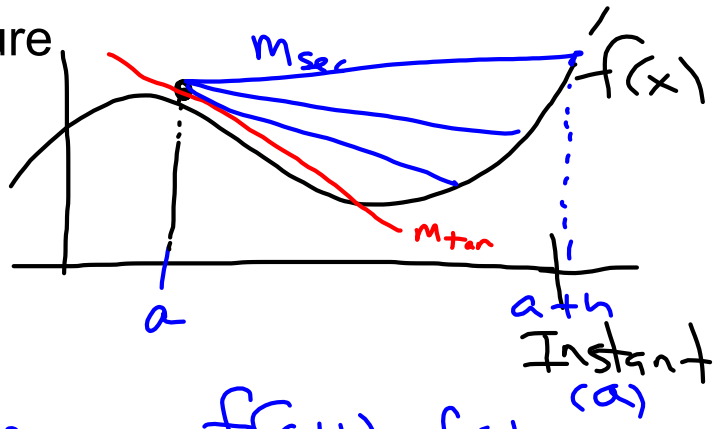

Plot1 Plot2 Plot3
Y1=(√(4+X)-2)/X


NORMAL FLOAT AUTO RE
X
Y1
0
ERROR
.1
.24846
1E-4
.25
-1E-4
.25


Y1=(√(4+X)-2)/X
X=0
Y=

Lecture

Lecture

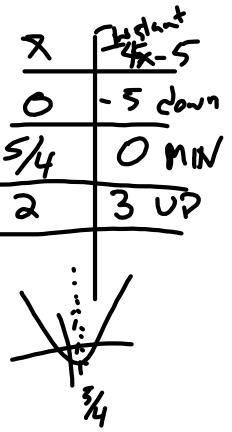


$$m_{sec} = \frac{f(a+h)-f(a)}{h}$$

$$m_{tan} = \lim_{h\to 0} \frac{f(a+h)-f(a)}{h}$$

Ex $f(x) = 2x^2 - 5x + 7$

x	Instant $4x-5$
0	-5 down
5/4	0 MIN
2	3 UP



m_{tan} at "a" $\lim_{h\to 0} \frac{f(a+h)-f(a)}{h}$

$f(a+h) = 2(a+h)^2 - 5(a+h) + 7$

$f(a+h) = 2a^2 + 4ah + 2h^2 - 5a - 5h + 7$

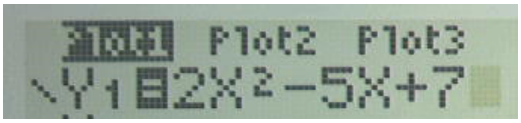
$f(a) = 2a^2 \quad -5a \quad +7$

$\Delta y: f(a+h)-f(a) = 4ah + 2h^2 - 5h$

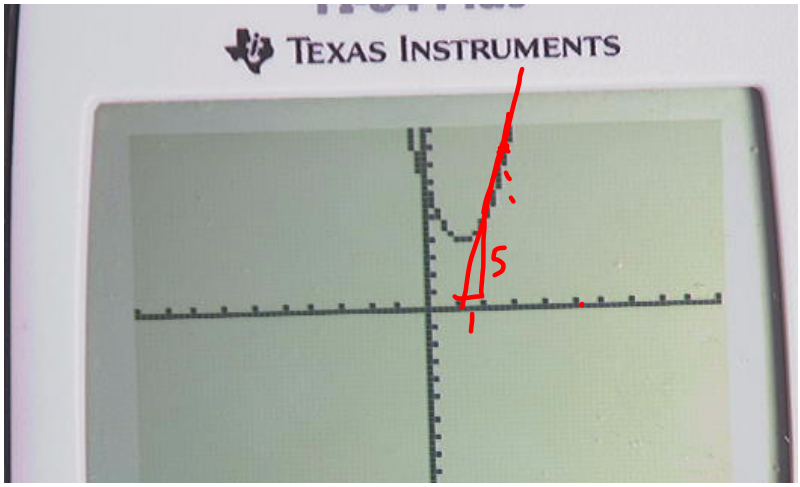
$\Delta x: h$

$$\frac{f(a+h)-f(a)}{h} = 4a + 2h - 5$$

$$\lim_{h\to 0} \frac{f(a+h)-f(a)}{h} = \lim_{h\to 0} 4a + 2h - 5 = 4a - 5$$



$m_{tan} = 4a - 5$



at $a = 3$

7

at $a = 1$

$4(1) - 5 = -1$

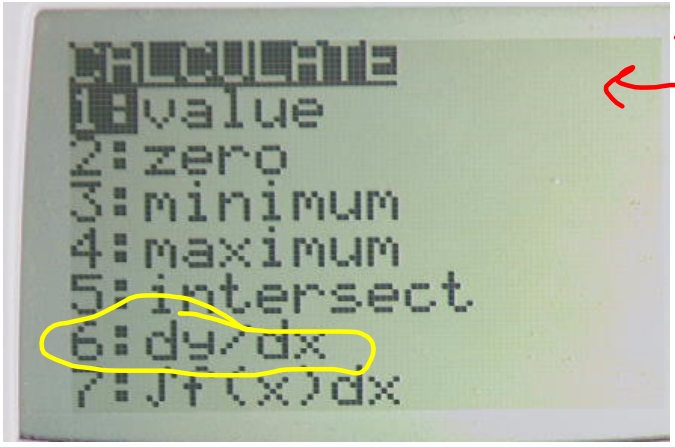
at $a = 5/4$

$4(5/4) - 5 = 0$

at $a = 0$

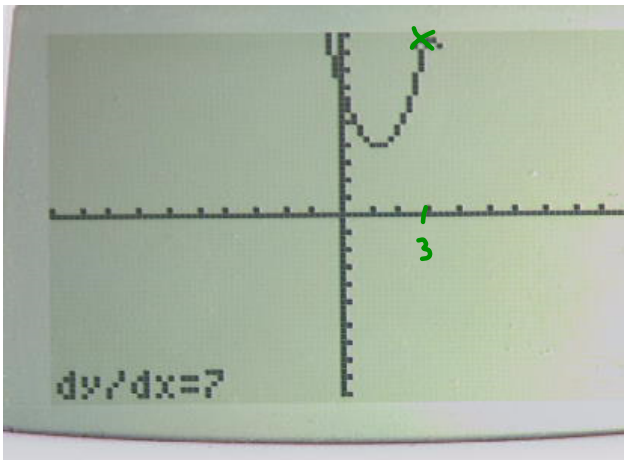
-5

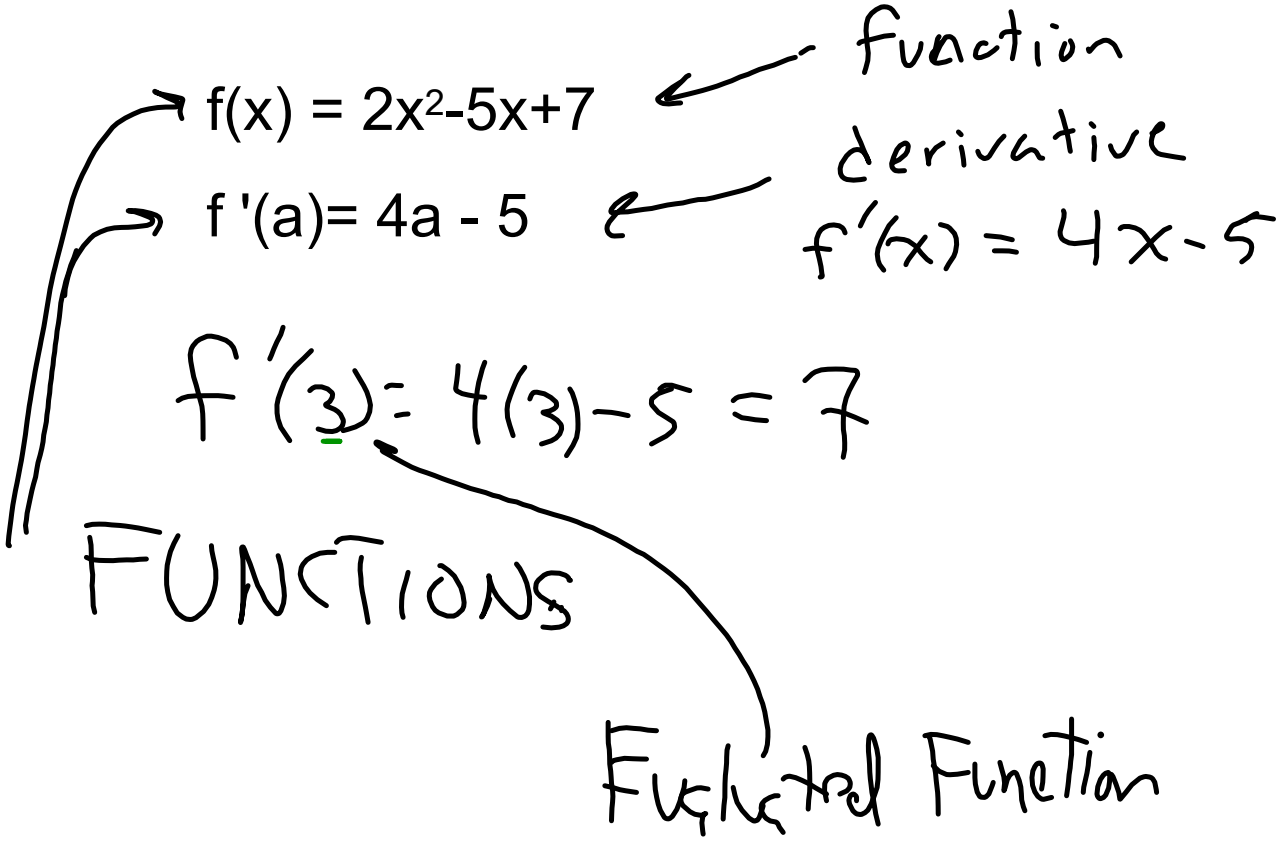
slope of tangent line at x=3 is about 5

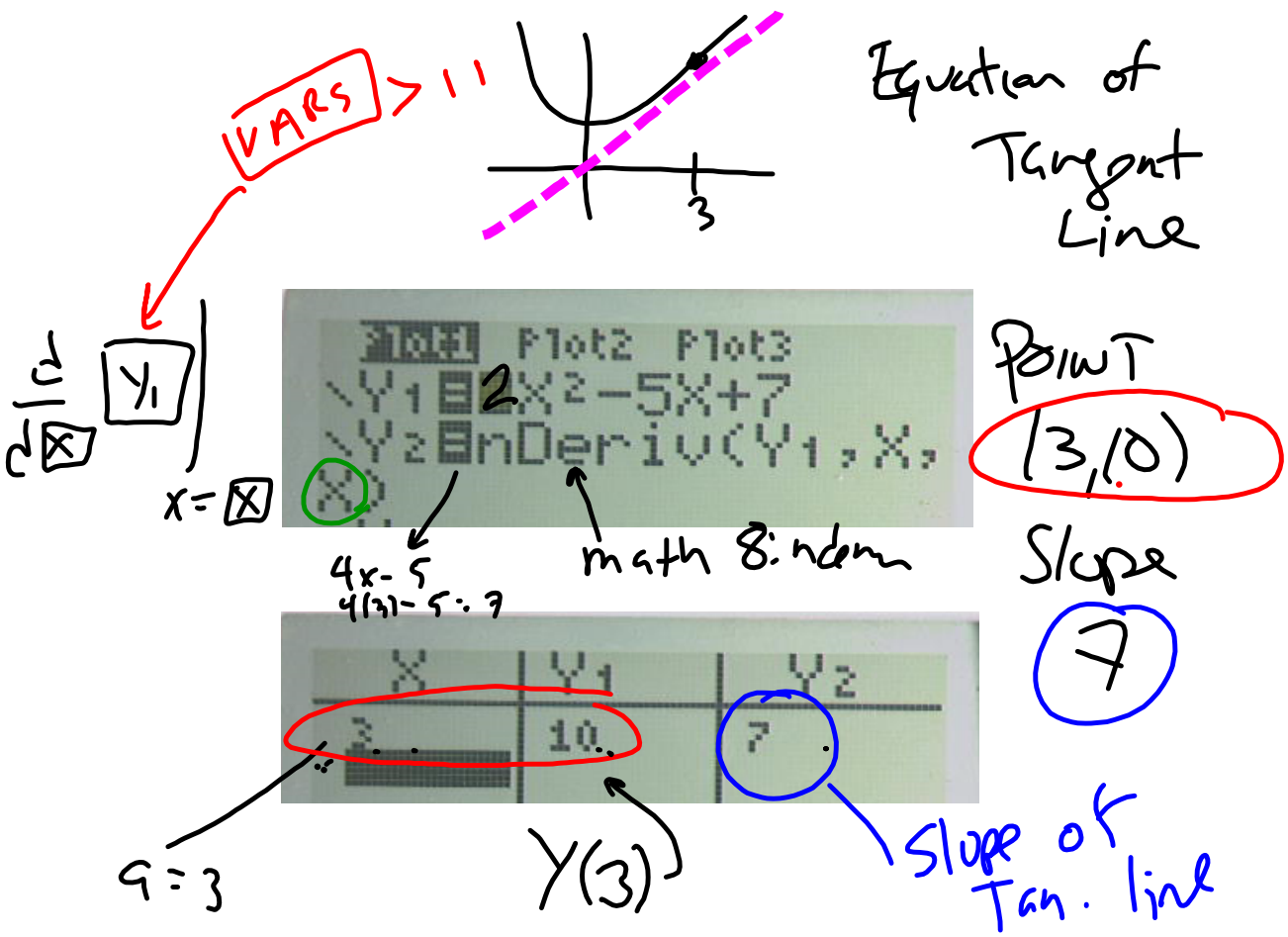


2nd Trace

x=3



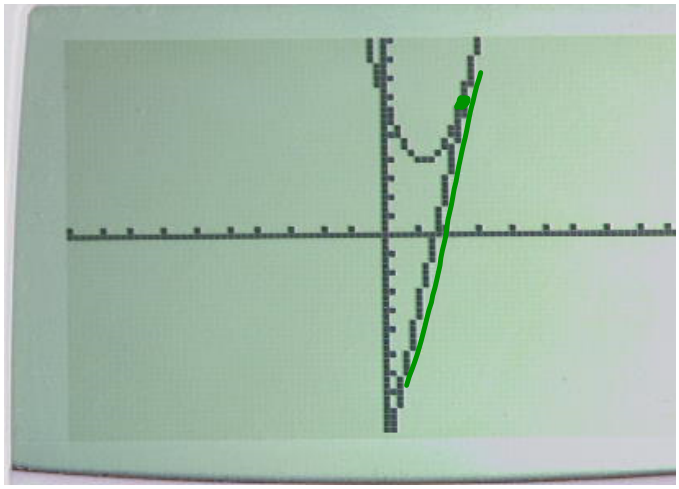

f(x) = 2x²-5x+7
function
f '(a)= 4a - 5
derivative
f'(x) = 4x-5
f'(3) = 4(3)-5 = 7
FUNCTIONS
Evaluated Function



Equation of Tangent Line $y - y_1 = m(x - x_1)$

$$y - 10 = 7(x - 3)$$

$$y = 7(x - 3) + 10$$



$Y_3 = 7(x-3)+10$

Find $f'(x)$. Use the definition

$$f(x) = \frac{1}{x-3}$$

$$f(a+h) = \frac{1}{a+h-3}$$

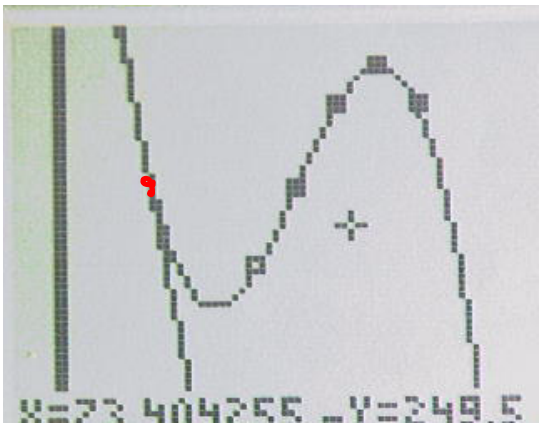
$$f(a) = \frac{1}{a-3}$$

$$f(a+h) - f(a) = \frac{1}{a+h-3} - \frac{1}{a-3}$$

$$\frac{a-3 - (a+h-3)}{(a+h-3)(a-3)} = \frac{-h}{}$$

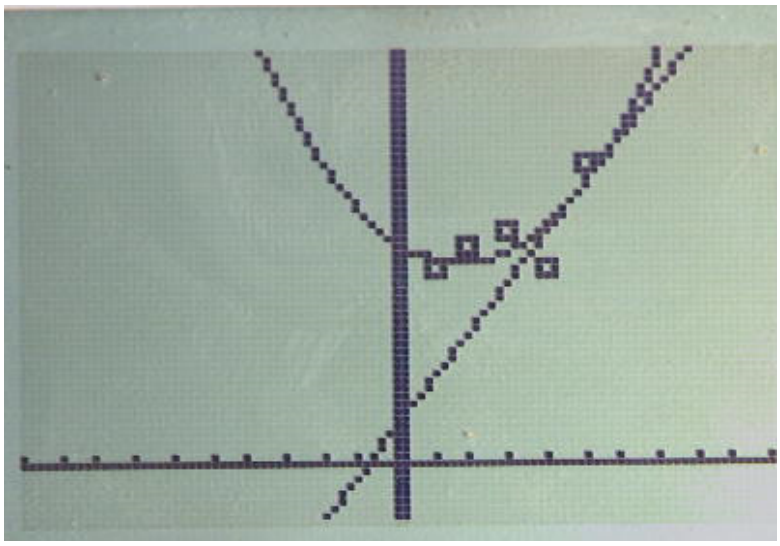
$$\lim_{h \to 0} \left[\frac{-h}{(a+h-3)(a-3)} \cdot \frac{1}{h} \right] = \lim_{h \to 0} \frac{-1}{(a+h-3)(a-3)}$$

$$= \frac{-1}{(a-3)^2}$$



Tangent Line

Equation + Graph



Get regression
Stat calc
VARS 5 >> 1

Y=

Y_1 = QuadReg

Y_2 = nDeriv(Y_1, X, X)

Table

X	Y_1	Y_2
7	yvalue	m

$Y_3 = m(X-7)+y_{value}$

Equation of the or Tangent Line

$y=m(x-a)+y_o$

y_1 = regression

y_2 = ndev (y, X, x)

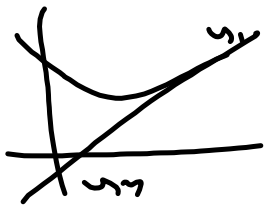
or

$\frac{d}{dx}[y_1]\Big|_{x=x}$

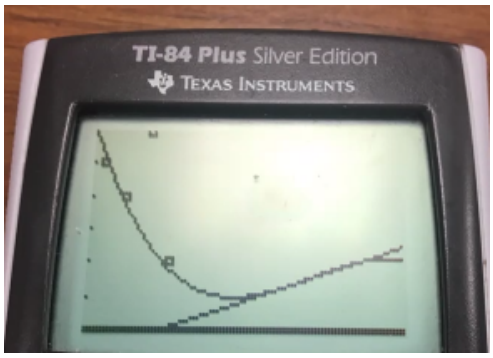
tangle

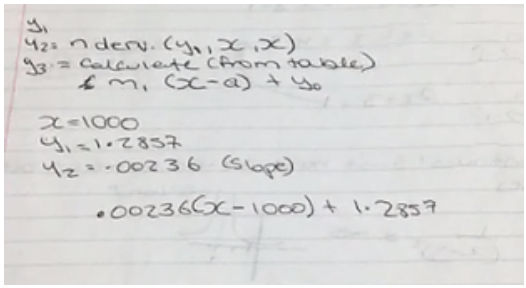
$a=3$	y_0	m_1

$y_3 = m_1(x-a)+y_0$

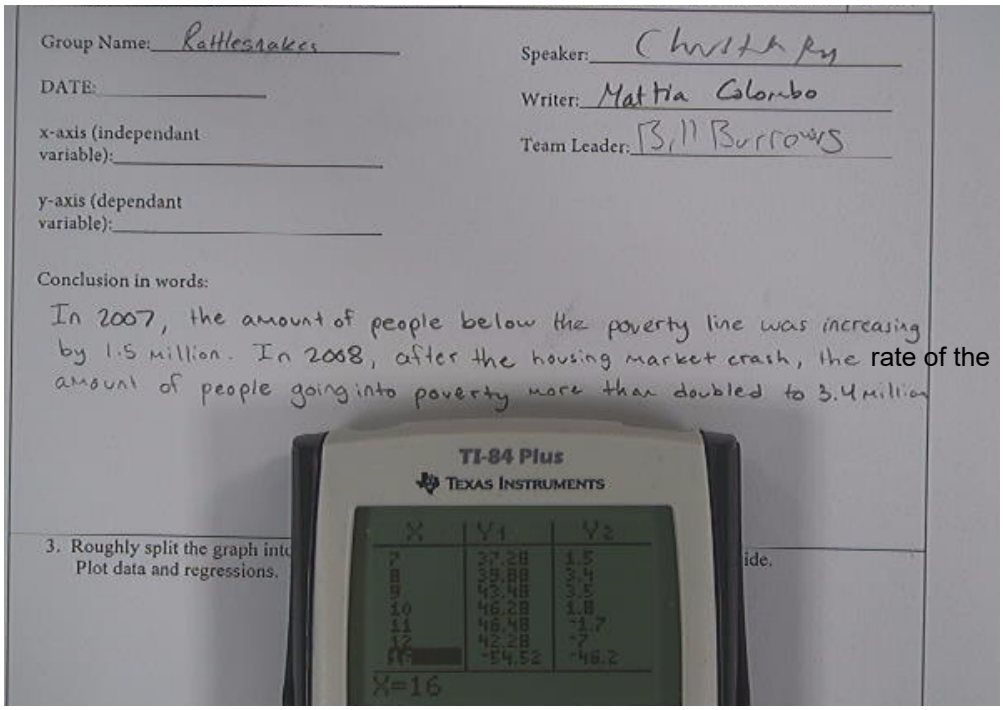


Group:


TI-84 Plus Silver Edition
Texas Instruments


Y1
Y2= nderiv. (Y1, X, X)
Y3= Calculate (from table)
ℓ m1 (X-a) + ya
X=1000
Y1=1.2857
Y2=.00236 (slope)
.00236(X-1000) + 1.2857

busines



Group Name: Rattlesnakes

Speaker: Christopher

DATE:

Writer: Mattia Colombo

x-axis (independant variable):

Team Leader: Bill Burrows

y-axis (dependant variable):

Conclusion in words:

In 2007, the amount of people below the poverty line was increasing by 1.5 million. In 2008, after the housing market crash, the rate of the amount of people going into poverty more than doubled to 3.4 million

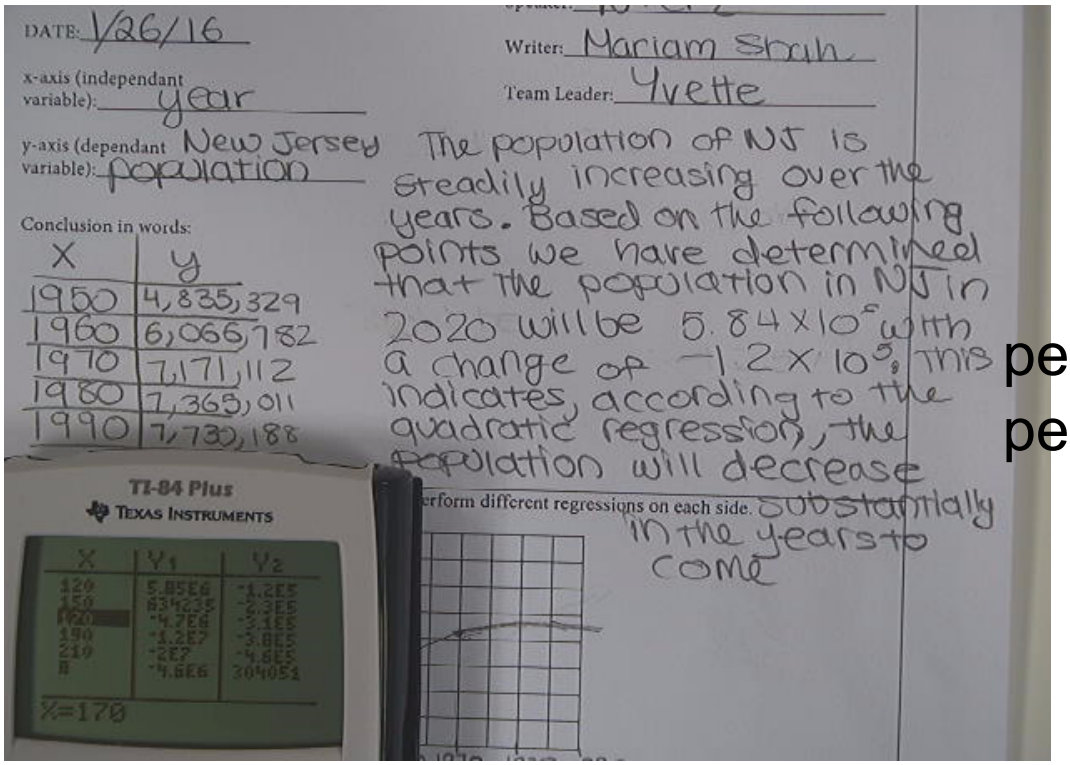
3. Roughly split the graph into
Plot data and regressions.

ide.

TI-84 Plus
Texas Instruments

X	Y1	Y2
7	37.28	1.5
8	39.88	3.4
9	43.48	3.6
10	46.28	1.8
11	46.48	-1.7
12	42.28	-7
13	-54.52	-46.2

X=16



DATE: 1/26/16

Writer: Mariam Shah

Team Leader: Yvette

x-axis (independant variable): year

y-axis (dependant variable): New Jersey population

Conclusion in words:

The population of NJ is steadily increasing over the years. Based on the following points we have determined that the population in NJ in 2020 will be 5.84×10^6 with a change of -1.2×10^5, this indicates, according to the quadratic regression, the population will decrease substantially in the years to come

X	y
1950	4,835,329
1960	6,066,782
1970	7,171,112
1980	7,365,011
1990	7,730,188

people per year

TI-84 Plus
TEXAS INSTRUMENTS

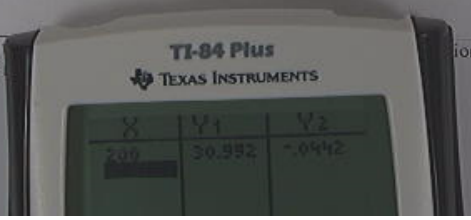
X	Y1	Y2
120	5.85E6	-1.2E5
150	8.3725	-2.3E5
160	-4.7E6	-3.1E5
190	-1.2E7	-3.8E5
210	-2E7	-4.8E5
0	-4.8E6	304051

X=170

y-axis (dependant variable):_____

Conclusion in words: When the horsepower is 200, the gas consumption reduces to ≈ 31 mpg. The instantaneous rate of gas consumption reduces to -0.044 mpg per horsepower.

3. Roughly split ... ions on each side.
Plot data and ...



Group Name: SPP

DATE: 1/26/16

x-axis (independant variable): yrs

y-axis (dependant variable): $

Speaker: Cierra

Writer: Rankita

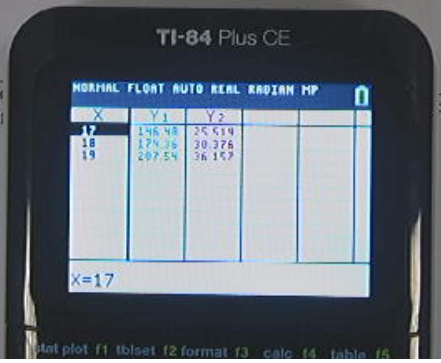
Team Leader: Shiv

Conclusion in words:

In 2017, the rate of change in salary increases which to $146.5 thousand. The instantaneous rate of an increase in salary is $25.5 thousand/year

3. Roughly split th
Plot data and re

ons on each side.



Groupwork

Limits

$\lim_{x \to a} f(x)$

Try first $f(a) = ??$

Ex $\lim_{x \to 3} 2x^2 - 5x + 7 = 10$

$f(3) = 10$

Ex $\lim_{x \to 2} \frac{x^2 - 4}{x - 2} =$

$f(2) = \frac{0}{0}$

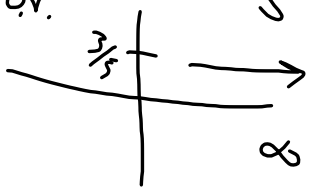
$= \lim_{x \to 2} \frac{(x-2)(x+2)}{(x-2)}$

$= \lim_{x \to 2} x + 2 = 4$

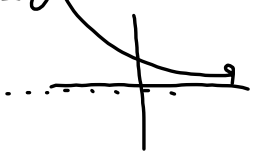
Ex $\lim_{x \to \infty} \frac{3x^2 - 8}{5x^2 + 7} = \frac{3}{5}$

DN = 2
DD = 2

Right End Behavior



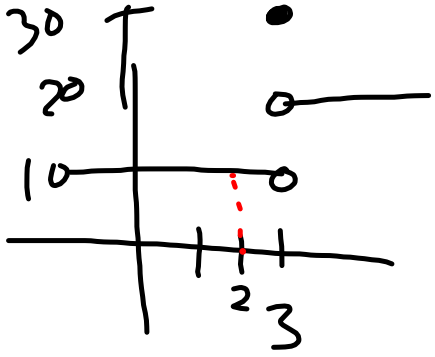
Ex $\lim_{x \to \infty} e^{-x} = 0$



Ex

$\lim_{x \to 2} f(x) = 10$

$\lim_{x \to 3} f(x) =$ Does not Exist



$f(3) = 30$

$f(2.9999) = 10$

$f(3.0001) = 20$

One Sided Limit:

$\lim_{x \to a^+} f(x) =$ Right Side Limit

$\lim_{x \to a^-} f(x) =$ Left Sided Limit

Finding limits for a piecewise-defined function

The function g is defined piecewise as follows.

$$g(x) = \begin{cases} (x-1)^2 - 2 & \text{if } x < 2 \\ \dfrac{x-5}{x+1} & \text{if } x > 2 \end{cases}$$

Find the following limits.
If a limit does not exist, click on "Does Not Exist."

(a) $\lim_{x \to 2^-} g(x)$

(b) $\lim_{x \to 2^+} g(x)$

(c) $\lim_{x \to 2} g(x)$

Finding limits for a piecewise-defined function

The function g is defined piecewise as follows.

$$g(x) = \begin{cases} (x-1)^2 - 2 & \text{if } x < 2 \\ \dfrac{x-5}{x+1} & \text{if } x > 2 \end{cases}$$

Left $(2-1)^2 - 2 = 1 - 2 = -1$

Right $\dfrac{2-5}{2+1} = \dfrac{-3}{3} = -1$

Find the following limits.
If a limit does not exist, click on "Does Not Exist."

(a) $\lim_{x \to 2^-} g(x)$ Left end

(b) $\lim_{x \to 2^+} g(x)$ Right end

(c) $\lim_{x \to 2} g(x)$ $= -1$

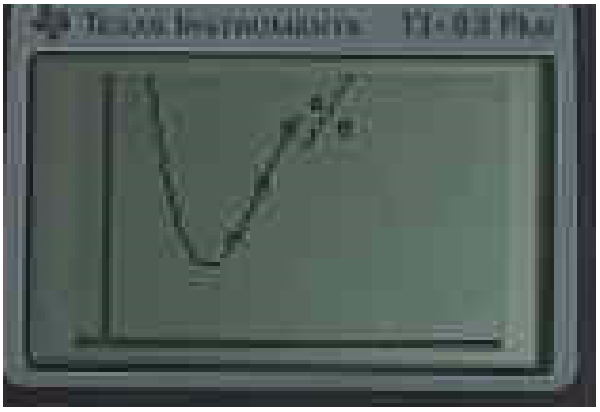
$$\lim_{x \to a^+} r_1(x) = \#$$

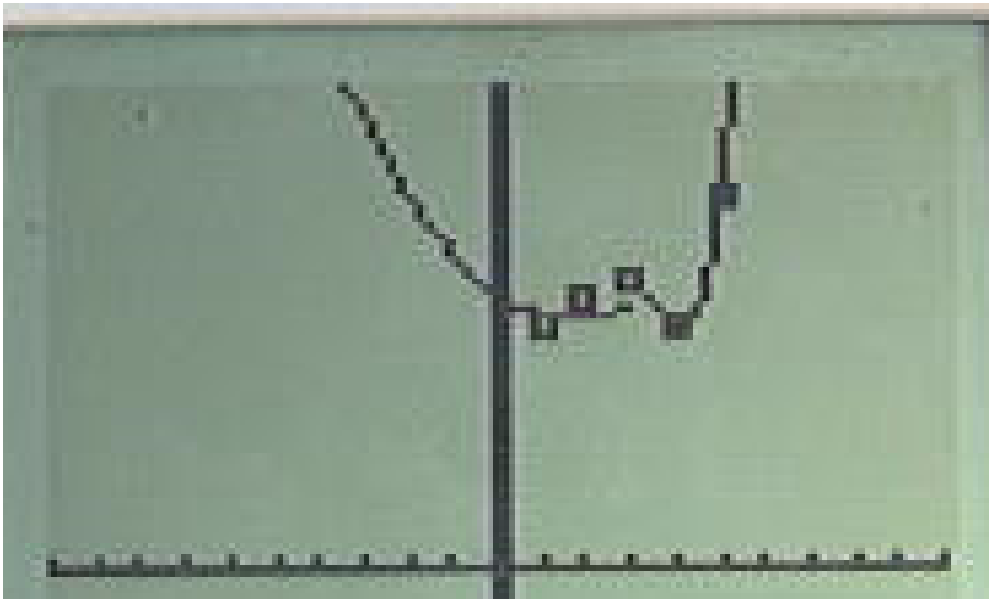
$$\lim_{x \to a^-} r_2(x) = \#$$

$$\lim_{x \to \infty} r_1(x) = \infty ?$$

$$\lim_{x \to \infty} r_2(x) = \infty ?$$


TEXAS INSTRUMENTS
TI-83 Plus
X
Y1
Y2
25
434.38
368.13





X	Y1	Y2
3	41.157	45.4

As progress to the third quarter, revue is expected $41.157 million

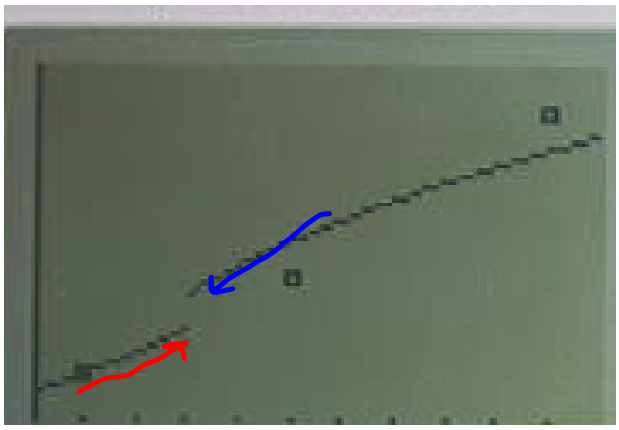
$$\lim_{x \to 3^-} Y_1(x) = 41.157$$

$$\lim_{x \to 3^+} Y_2 = 45.4$$

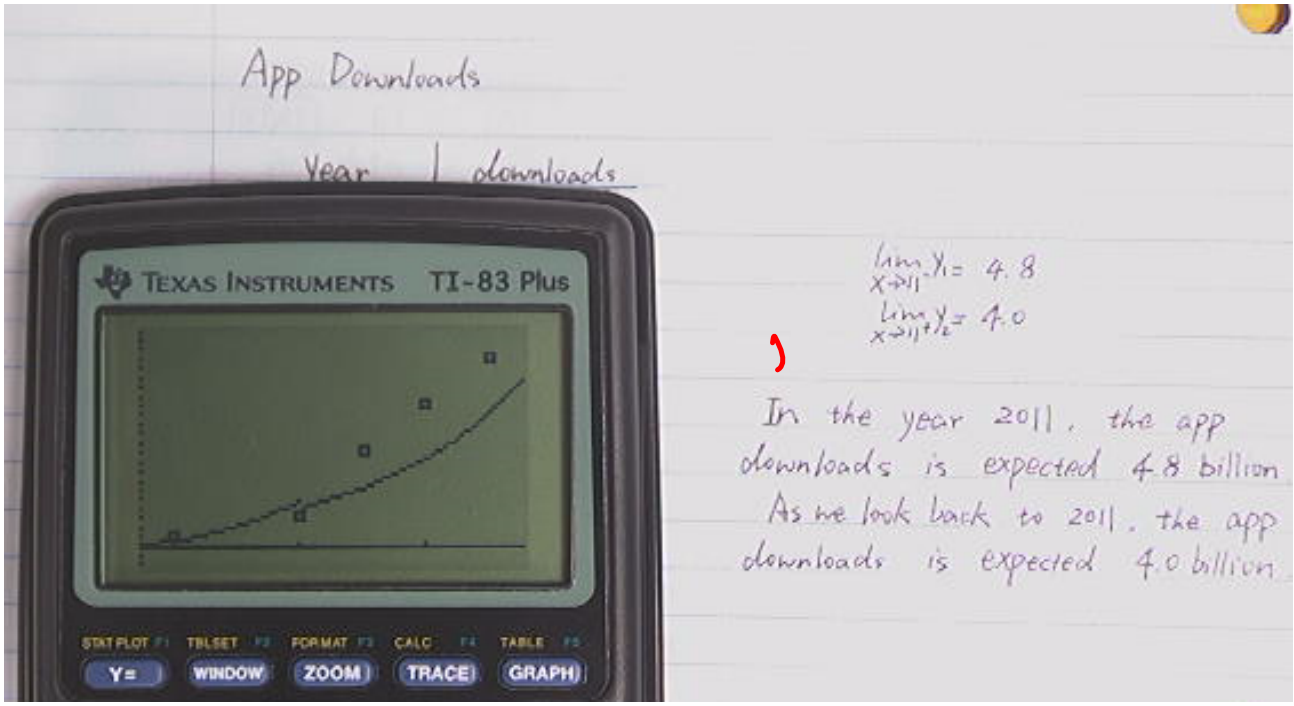
As we look bavk to the third quarter, revenue is expectėd to be 45.4 mil

As we approach 75 years of age, there will be ≈434.38 thousand cases of breast cancer.

X	Y_1	Y_2
3	56.456	65.579



$\lim_{x \to 3^+} y_2$


App Downloads
Year | downloads
TEXAS INSTRUMENTS TI-83 Plus
STAT PLOT F1 TBLSET F2 FORMAT F3 CALC F4 TABLE F5
Y=
WINDOW
ZOOM
TRACE
GRAPH
lim x→11⁻ Y1 = 4.8
lim x→11⁺ Y2 = 4.0
In the year 2011, the app downloads is expected 4.8 billion
As we look back to 2011, the app downloads is expected 4.0 billion