1. Roughly plot data and regression. Label Axis.

zoom:9

y1=vars 5
>>RegEq

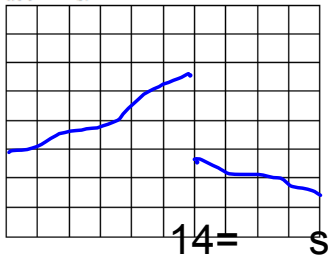
Regression used:	Quartic
First x (a)	1
Last x (b)	9

Find the average rate of change between the first and last x-values using regression

{Y1(b)-Y1(a)}/{b - a}	Average Rate of Change	.11 $ per yr

{y1(9)-y1(1)}/(9-1) = .11

2. Roughly split the graph into two regions and perform different regressions on each side. Plot data and regressions. Label Axis.



14= split of interest

left regression split at a Y1=vars 5: > > 1: RegEq /(x≤14	Left Regression used:	exponential
right regression Y2=vars 5: > > 1: RegEq /(x≥14	Right Regression used:	quadratic
	Location of split (a)	14
Find Y1(14) Y2(14)	$\lim_{x\to a^-} r(x)$	5.85
	$\lim_{x\to a^+} r(x)$	2.6

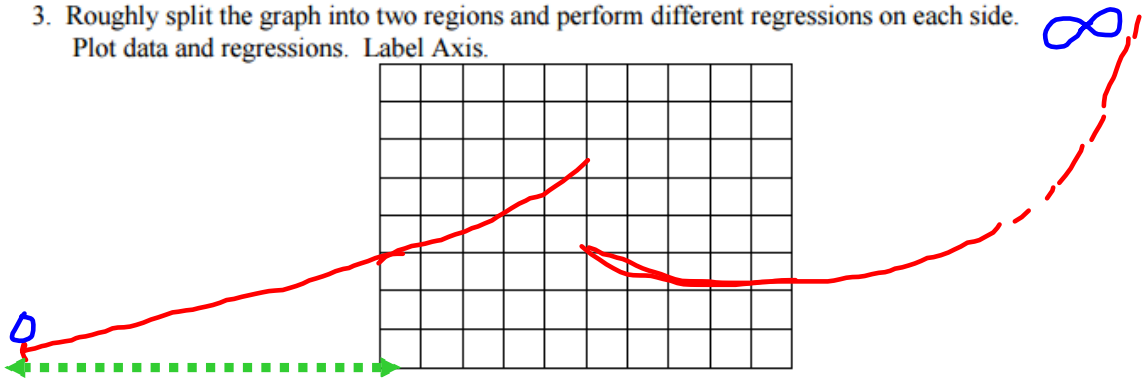
table x y1 y2

13 5.8 error

15 error 2.5

14 5.85 2.6

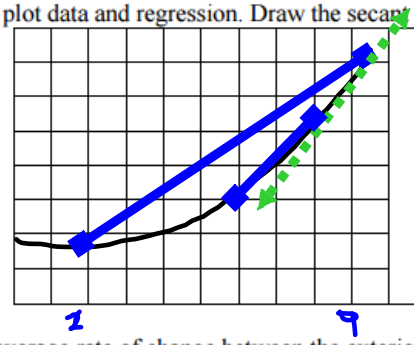
3. Roughly split the graph into two regions and perform different regressions on each side. Plot data and regressions. Label Axis.



left regression split at a Y1=vars 5: > > 1: RegEq /(x≤a) right regression Y2=vars 5: > > 1: RegEq /(x≥a)	Left Regression used:	exponential
	Right Regression used:	quadratic
Find Y1(-9999) ≈ 0 Y2(9999) ≈ 9. x10^5	$\lim_{x\to-\infty} r(x)$	0
	$\lim_{x\to+\infty} r(x)$	∞

end behaviour

5. Roughly plot data and regression. Draw the secant and tangent lines at x = a Label Axis.



Pick x values in order

X1=	3
X2=	6
X3=	7.9
a=	8
X4=	8.1
X5=	8.5
X6=	9

point of interest

Find the average rate of change between the exterior x-values around x = a using regression

$\{Y1(x1) - Y1(x6)\}/\{x1 - x6\} = m_{sec}$	Average Rate of Change	7/5 1.4

Find the average rate of change between an interior x-values around x = a using regression

$\{Y1(x2) - Y1(x5)\}/\{x2 - x5\} = m_{sec}$	Average Rate of Change	5/4 1.25

Find the average rate of change between the more interior x-values around x = a using regression

$\{Y1(x3) - Y1(x4)\}/\{x3 - x4\} = m_{sec}$	Average Rate of Change	9/3 (close) 1.65

Find the instnataneous rate of change at x = a

nderiv(y1,x,a) or calc 6:dydx and x =a 8	Instant Rate of Change	8/5 1.6

6. Find the derivatives of different regressions using rules at x = x1

Linear Regression y1=ax+b	y'= a	y'(x1) =
Quadratic Regression $y2=ax^2+bx+c$	y'= 2ax+b	y'(x1) =
Cubic Regression $y3=ax^3+bx^2+cx+d$	$y'= 3ax^2+2bx+c$	y'(x1) =
Quartic Regression $y4=ax^4+bx^3+cx^2+dx+e$	$y'=4ax^3+3bx^2+2cx+d$	y'(x1) =

Compaire to y5 = nderv(y4,x,x) at x = x2, x3, x4

X2=	y4'(x2) =
X3=	y4'(x3) =
X4=	y4'(x4) =

x1= point of interest (2016)

x2=2017

x3=2018

x4=2019

7. Find the derivatives of different regressions using rules at x = x1

Exponential y6=a*b^x	y'= a*b^x*ln(b)	y'(x1) =
Ln Regression y7=alnx+b	y'= a/x	y'(x1) =

Compaire to y8 = nderv(y6,x,x) at x = x2, x3, x4

x1= point of interest

X2=	y8'(x2) =
X3=	y8'(x3) =
X4=	y8'(x4) =

8. .Find the second derivatives of different regressions using rules at x = x1

Linear Regression y1=ax+b	y''= 0	y''(x1) =
Quadratic Regression y2=ax^2+bx+c	y''= 2a	y''(x1) =
Cubic Regression y3=ax^3+bx^2+cx+d	y''= 6ax+2b	y''(x1) =
Quartic Regression y4=$ax^4+bx^3+cx^2+dx+e$	y''=$12ax^2+6bx+2c$	y''(x1) =

Compaire to y5 = nderv(nderiv(y4,x,x),x,x) at x = x2, x3, x4

X2=	y4''(x2) =
X3=	y4''(x3) =
X4=	y4''(x4) =

8. .Find the second derivatives of different regressions using rules at x = x1

Linear Regression y1=ax+b	y''= 0	y''(x1) =
Quadratic Regression y2=ax^2+bx+c	y''= 2a	y''(x1) =
Cubic Regression y3=ax^3+bx^2+cx+d	y''= 6ax+2b	y''(x1) =
Quartic Regression y4=$ax^4+bx^3+cx^2+dx+e$	y''=$12ax^2+6bx+2c$	y''(x1) =

Compaire to y5 = nderv(nderiv(y4,x,x),x,x) at x = x2, x3, x4

X2=	y4''(x2) =
X3=	y4''(x3) =
X4=	y4''(x4) =