Prof. Porter	Mercer County College	Spr 2014	REGRESSION PROJECT WORK SHEET	Part 2

1. Roughly plot data and regression. Label Axis.

Regression used:	
First x (a)	
Last x (b)	

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	

2. 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:	
	Right Regression used:	
	Location of split (a)	
Find Y1(a) Y2(a)	$\lim_{x\to a^-} r(x)$	
	$\lim_{x\to a^+} r(x)$	

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)	Left Regression used:	
right regression Y2=vars 5: > > 1: RegEq /(x≥a)	Right Regression used:	
Find Y1(-9999) Y2(9999)	$\lim_{x\to-\infty} r(x)$	
	$\lim_{x\to+\infty} r(x)$	

4. For a continuous regression: Given ε = small number Find δ > 0 that satisfies
Roughly adjust the regressions so the graph is continuous.
Plot data and graph the regressions. Label Axis.

a=

a=split location

Y1=regression 1 /(x <= a) Y2=2nd regression /(x >=a)+adjust for continuity_____ Y3 = L - ε (.01) ________	$\lim_{x\to a} r(x) = L$	
Y4 = L+ ε (.01)_________	Given ε =	(.01 as default)
Calc 5:intersect y1 and y3(or4) = x1 ______ Calc 5:intersect y2 and y4(or3) = x2 ______ δ = minimum(|a-x1|,|a- x2|)	Find δ =	

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

Pick x values in order

X1=	
X2=	
X3=	
a=	
X4=	
X5=	
X6=	

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	

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	

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	

Find the instnataneous rate of change at x = a

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

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) =

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

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

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) =

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

9. Make a transformation of your x-values and your y-values

New x-values (units)	Old x-values(units)	Y1=
Old x-values(units)	Old y-values(units)	Y2(regression)=
Old y-values(units)	New y-values(units)	Y3=

Example: cm to inches y1=x/2.54 Inches to lbs y2=linreg Lbs to kg y3=x/2.2 Y4’(A)= nderiv(y3,x,(y2,x,(y1,x,A)))*nderiv,(y2,x,(y1,x,A))* nderiv(y1,x,A)	Regression used:	
	New x-value(A)	
	Y4’(A)	
	units	

10. Find the derivatives of sine regression using rules at x = x1

Sine Regression y2=asin(bx+c)+d	y'= acos(bx+c)*b	y'(x1) =

Find the second derivatives of sine regression using rules at x = x1

Sine Regression y2=asin(bx+c)+d	y''= -asin(bx+c)*b^2	y''(x1) =

11. Use the mean value theorem on the two end points OF a regression and identify a point on the graph with a similar slope?

Y1=regEq Y2=nderiv(y1,x,x) Y3="average rate of change" Calc 5:intersect	Regression used:	
	Ave Rate of change:	
	Point(s) of intersection:	

12. Was the zero found by using Newton's Method for by using x=0 or x=1 as an initial guess?

Y1=cubicregression
0 sto x
x-y1/nderv(y1,x,x)stox

iteration____________________________

iteration____________________________

iteration____________________________

zero:_____________________________________

13. Error: Find the error in your x-values: (.5 times last Significant figure: _____ dx

What regression used: ______________________

y1= regression equation (

y2 = nderiv(y1, x,x) * dx

y3= y2 / y1 *100

a= ____ value

At a, the value is y1(a), error is y2(a) with percent error y3(a)

14 Graph the cubic or quartic regression, identify all critical points, concavity, and inflection points.

X:									
Y’									
Increasing or Deceasing									
Y’’									
Concavity? Up or Down									

15.

Find y’=0 to identify critical values a1,a2

Critical Points	

Find y’’(a1) and y”(a2) to determine max/min

Y’’ at critical Points	
Max or Min	

16. Find y’’=0 to identify inflection points Did the student take the second derivative and identify concavity for the zero of the cubic regression? Y’’=0 at –b/(6a):______________________________

Inflection Points	

17. Was the area under the best regression and between the first and last values found using calculator?

Calc 7: lower______ Upper:_________

Regression f(x):____

Calc 7: ∫f(x)dx =____

18. Were the units identified for the area under the curve?

Units (y) * Units (x) =____

Was the average value given?

Area (from 15) divided by (last x-first x):_____________________________________

19. Was the area under the best regression and between the first and last values approximated using left and right endpoint rectangles?

X:									
Y:									

Sum of 8 or so rectangles left endpoints:_________________

Sum(seq(y1,x,lower, upper – Δx, Δx))* Δx

20. Find A(n) for the linear regression.

Find the exact area by finding the limit as n goes to infinity

ANSWER:____

21. Given the quartic or cubic regression, use the fundamental theorem of calculus to find the area under the curve from a to b.

Y1= : ∫regerssion(x)dx
Y2= regression (x)

Evaluate y1(b) – y1(a):____

Compare to calc7: ∫f(x)dx
lower limit a
upper limit b

∫f(x)dx =____