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

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| {Y1(b)-Y1(a)}/{b - a} | Average Rate of Change |  |

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| 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 *r*(*x*)  *x**a* |  |
| lim *r*(*x*)  *x**a* |  |

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|  | Prof. Porter | Mercer County College | Fall 2017 | REGRESSION PROJECT WORK SHEET | Part 2 |
| 1. Roughly plot data and regression. Label Axis.  Find the average rate of change between the first and last x-values using regression | | | | | |
| 2. Roughly split the graph into two regions and perform different regressions on each side. Plot data and regressions. Label Axis. | | | | | |

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

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| 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: |  |
| Find Y1(-9999)  Y2(9999) | lim *r*(*x*)  *x* |  |
| lim *r*(*x*)  *x* |  |

1. For a continuous regression: Given ɛ = small number Find δ > 0 that satisfies Roughly adjust the regressions so the graph is continuous.

Plot data and graph the regressions. Label Axis.

**BONUS**

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| --- | --- | --- |
| Y1(x)=regression (y2=split regression) Y3=L- ɛ  Y4=L+ ɛ  Calc 5:intersect y1 and y3 = x1 Calc 5:intersect y1(2) and y4 = x2 δ = maximum(|a-x1|,|a- x2|) | lim *r*(*x*) =L  *x**a* |  |
| Given ɛ = |  |
| Find δ = |  |

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

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

|  |  |  |
| --- | --- | --- |
| {Y1(x1) - Y1(x6)}/{x1 – x6}= msec | 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}= msec | 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}= msec | 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=ax2+bx+c | y’= 2ax+b | y’(x1) = |  |
|  | Cubic Regression y3=ax3+bx2+cx+d | y’= 3ax2+2bx+c | y’(x1) = |  |
|  | Quartic Regression y4=ax4+bx3+cx2+dx+e | y’=4ax3+3bx2+2cx+d | y’(x1) = |  |

# Choose a regression, evaluate it at x1: y(x1)=

According to the

we expect y to be y(x1)= of y'(x1)=

regression, at x1=

with a growth rate

|  |  |  |
| --- | --- | --- |
| Exponential y6=a\*b^x | y’= a\*b^x\*ln(b) | y’(x1) = |
| Ln Regression y7=alnx+b | y’= a/x | y’(x1) = |

# Choose a regression, evaluate it at x1: y(x1)=

According to the

we expect y to be y(x1)= of y'(x1)=

regression, at x1=

with a growth rate

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

|  |  |  |
| --- | --- | --- |
| Linear Regression y1=ax+b | y’’= 0 | y’’(x1) = |
| Quadratic Regression y2=ax2+bx+c | y’’= 2a | y’’(x1) = |
| Cubic Regression y3=ax3+bx2+cx+d | y’’= 6ax+2b | y’’(x1) = |
| Quartic Regression y4=ax4+bx3+cx2+dx+e | y’’=12ax2+6bx+2c | y’’(x1) = |

# Choose a regression, evaluate it at x1: y(x1)=

According to the

we expect y to be y(x1)=

regression, at x1=

with a growth rate

of y'(x1)=

and it is

* 1. Make a transformation of your x-values and your y-values

|  |  |
| --- | --- |
| New x-values (units) | Old x-values(units) |
|  |  |
| Old x-values(units) | Old y-values(units) |
|  |  |
| Old y-values(units) | New y-values(units) |
|  |  |

* 1. 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) = |

# According to the sine regression with a period of

, at

x1= we expect y to be y(x1)=

with a growth rate of

y'(x1)=

and it is

|  |  |  |
| --- | --- | --- |
| 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: |  |

|  |
| --- |
| 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? |
| 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. |

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| 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