Answer Key

G302 – Final Take-Home Quiz / Project (50 pts)

Go to the G302 class web site via www.wou.edu/~taylors. The following data files are located in the lab data section under the "Final Project" heading:

app_morph.xls	Microsoft Excel Spreadsheet with Appalachian Drainage Basin data
fracture.xls	Microsoft Excel Spreadsheet with Fracture Orientation Data (strike/dip)
bachpt.dat	A comma-delimited text file with x,y,z elevation data for Mt. Bachelor

Note: Compile your take-home quiz products in a nice, neat, well-organized, professional-looking folder. Place your products (see below) in the order listed. Clearly label and organize all of your work.

Task 1 – Digital Mapping with Surfer

Using surfer and the Mt. Bachelor elevation data (elevation in meters, Eastings and Northings in meters), create and print the following maps (include your name, a title, and make them look nice with labels and lines):

A. Contour Map with Contour Interval of 10 meters
B. Contour Map with Contour Interval of 20 meters
C. Shaded Relief Map with Sun Azimuth of 335 and inclination of 45
D. Shaded Relief Map with Sun Azimuth of 200 and inclination of 30
E. A wireframe model
F. Create a vector map and overlay in on the 10 m contour map

Task 2 – Plotting Stereonets with Rockworks

Using the fracture data from the web site, plot a stereonet with poles to bedding (show all of the fractures on one stereonet).

Task 3 – Rose Diagrams with Grapher

Using the fracture data from the web site, plot a rose diagram of the fracture data (show all of the fractures on one graph)

Task 3A – Rose Diagrams with Rockworks

Using the fracture data from the web site, plot a rose diagram of the fracture data (show all of the fractures on one graph).

Task 4 – Morphometric Analysis Using Grapher and Excel

The Appalachian morphometric data was collected from three watersheds (Fernow, Little River, and North Fork). Data on the app_morph.xls workbook is organized into three worksheets, these include: Channel Slope (channel slopes of channel segments, drainage area upstream, locality), Channel Width (valley width, distance from drainage divide, locality), and Hillslopes (slope length, slope angle, aspect (azimuth direction that the hillslopes face), and locality).

Your job is to use a combination of Excel and Grapher to produce the following graphs / analytical products:

X-Y Plot of Drainage Area (y axis) vs. Slope (x axis) Fernow Area (with linear regression)
X-Y Plot of Drainage Area (y axis) vs. Slope (x axis) North Fork Area (with linear regression)
X-Y Plot of Drainage Area (y axis) vs. Slope (x axis) Little River Area (with linear regression)

X-Y Plot of Valley Width (y axis) vs. Distance from Divide (x axis) Fernow Area (with linear regression)
X-Y Plot of Valley Width (y axis) vs. Dist. From Divide (x axis) North Fork Area (with linear regression)
X-Y Plot of Valley Width (y axis) vs. Dist. From Divide (x axis) Little River Area (with linear regression)

Rose Diagram of Hillslope Aspect Fernow Area
Rose Diagram of Hillslope Aspect North Fork Area
Rose Diagram of Hillslope Aspect Little River Area

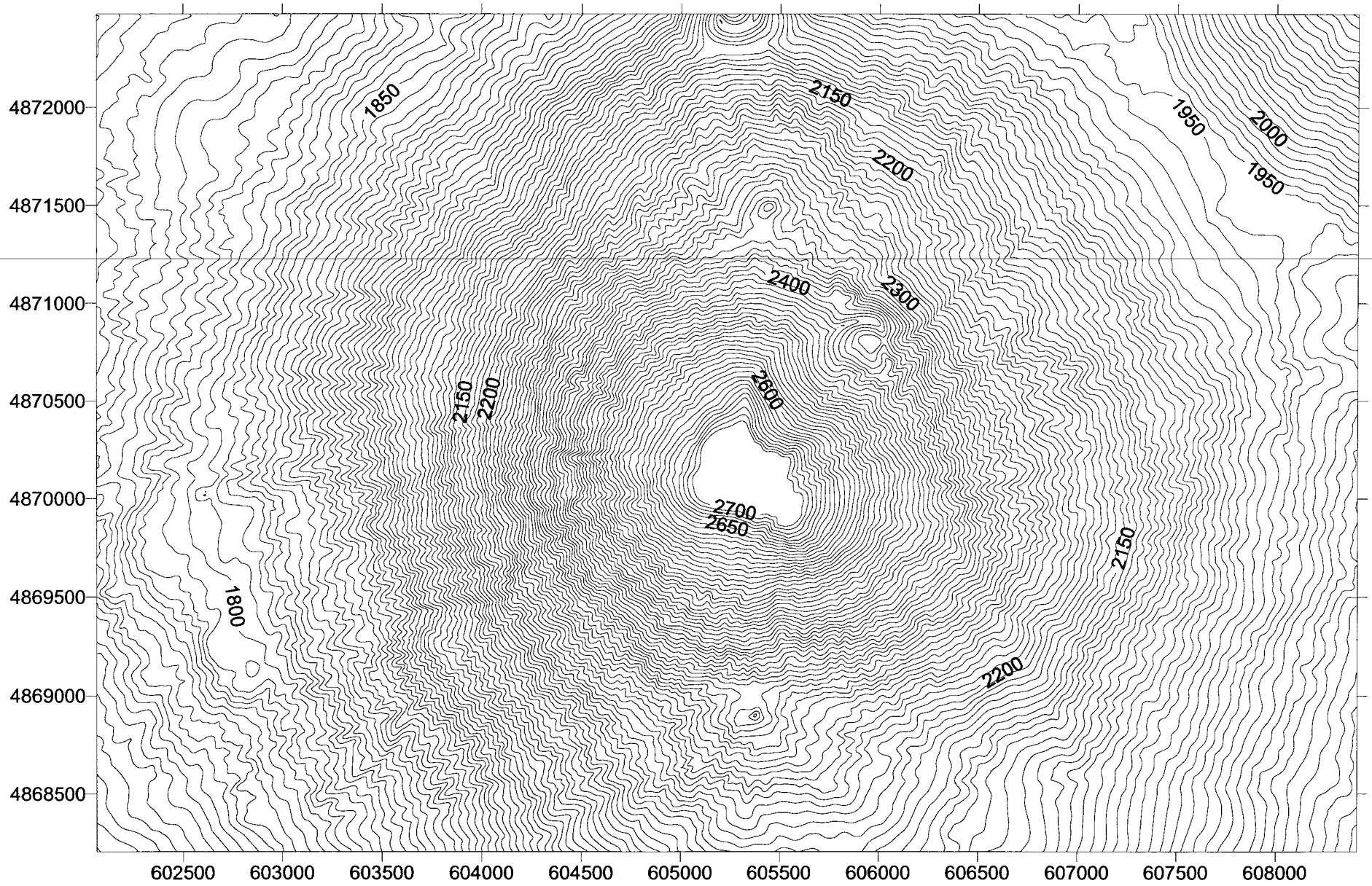
Polar Plot of Slope Gradient vs. Aspect Fernow Area
Polar Plot of Slope Gradient vs. Aspect North Fork Area
Polar Plot of Slope Gradient vs. Aspect Little River Area

X-Y Plot of Slope Length (y axis) vs. Hillslope Gradient (x axis) Fernow Area (with linear regression)
X-Y Plot of Slope Length (y axis) vs. Hillslope Gradient (x axis) North Fork Area (with linear regression)
X-Y Plot of Slope Length (y axis) vs. Hillslope Gradient (x axis) Little River Area (with linear regression)

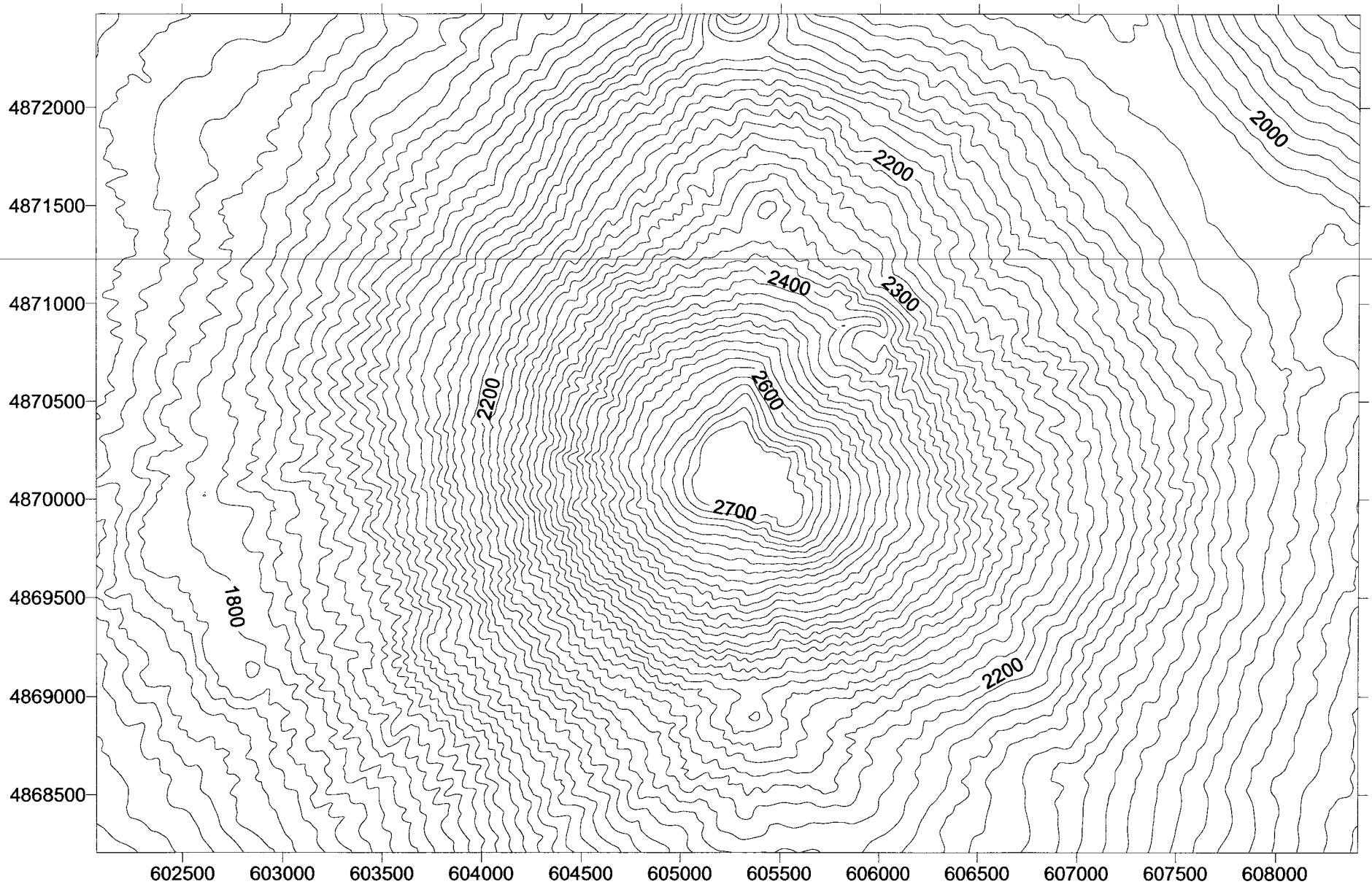
Statistical Summary – Filling in the Table Below

	Hillslope Length Fern, Nfork, Lriv	Hillslope Gradient Fern, Nfork, Lriv	Valley Width Fern, Nfork, Lriv
Minimum Value	____, ____, ____	____, ____, ____	____, ____, ____
Maximum Value	____, ____, ____	____, ____, ____	____, ____, ____
Range	____, ____, ____	____, ____, ____	____, ____, ____
Standard Deviation	____, ____, ____	____, ____, ____	____, ____, ____
Variance	____, ____, ____	____, ____, ____	____, ____, ____
Mean	____, ____, ____	____, ____, ____	____, ____, ____
Median	____, ____, ____	____, ____, ____	____, ____, ____
25th percentile	____, ____, ____	____, ____, ____	____, ____, ____
Number of Obs.	____, ____, ____	____, ____, ____	____, ____, ____

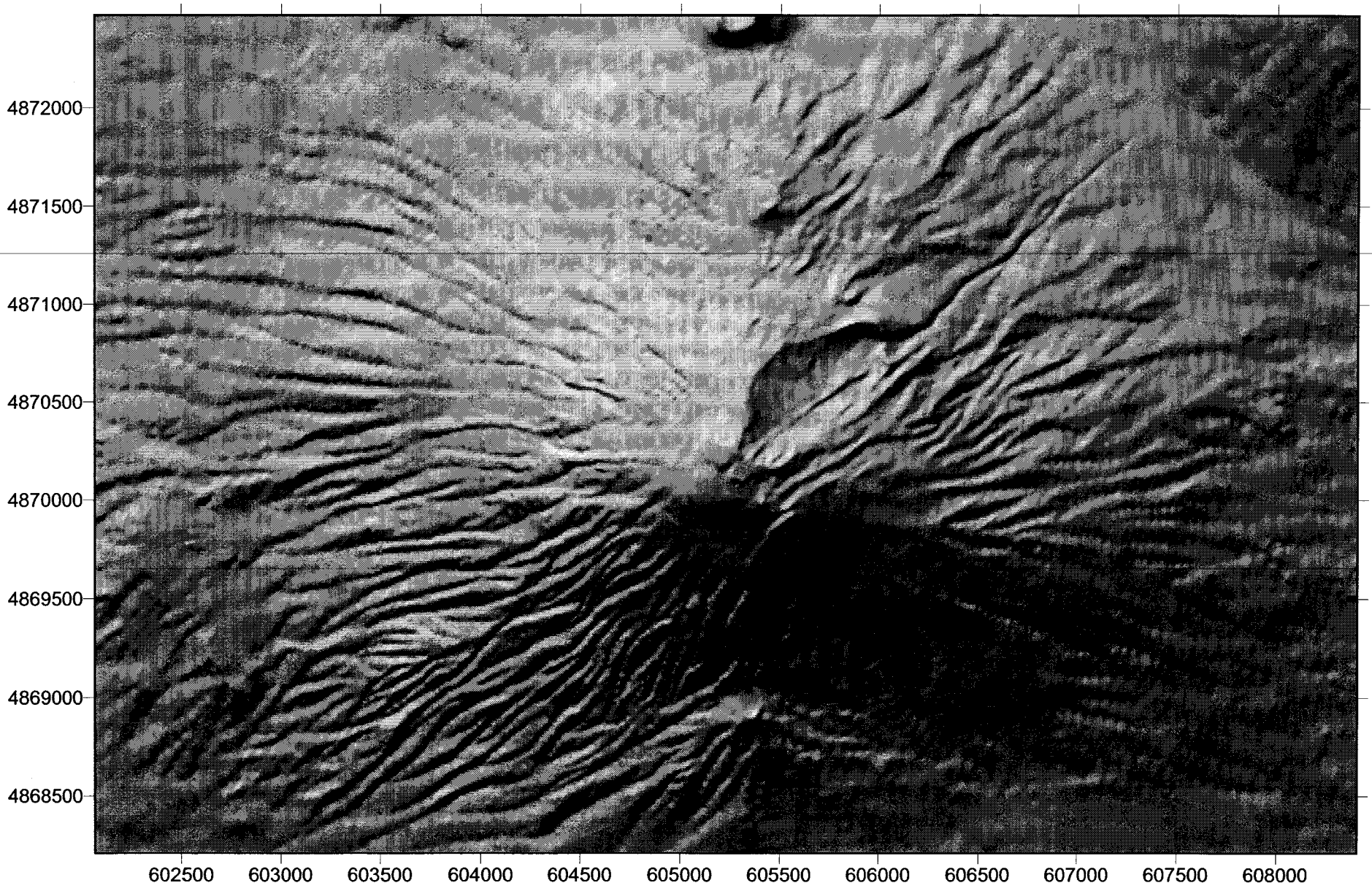
G302 Final Quiz; Task 1A
Mt Bachelor Contour Map (CI = 10 m)



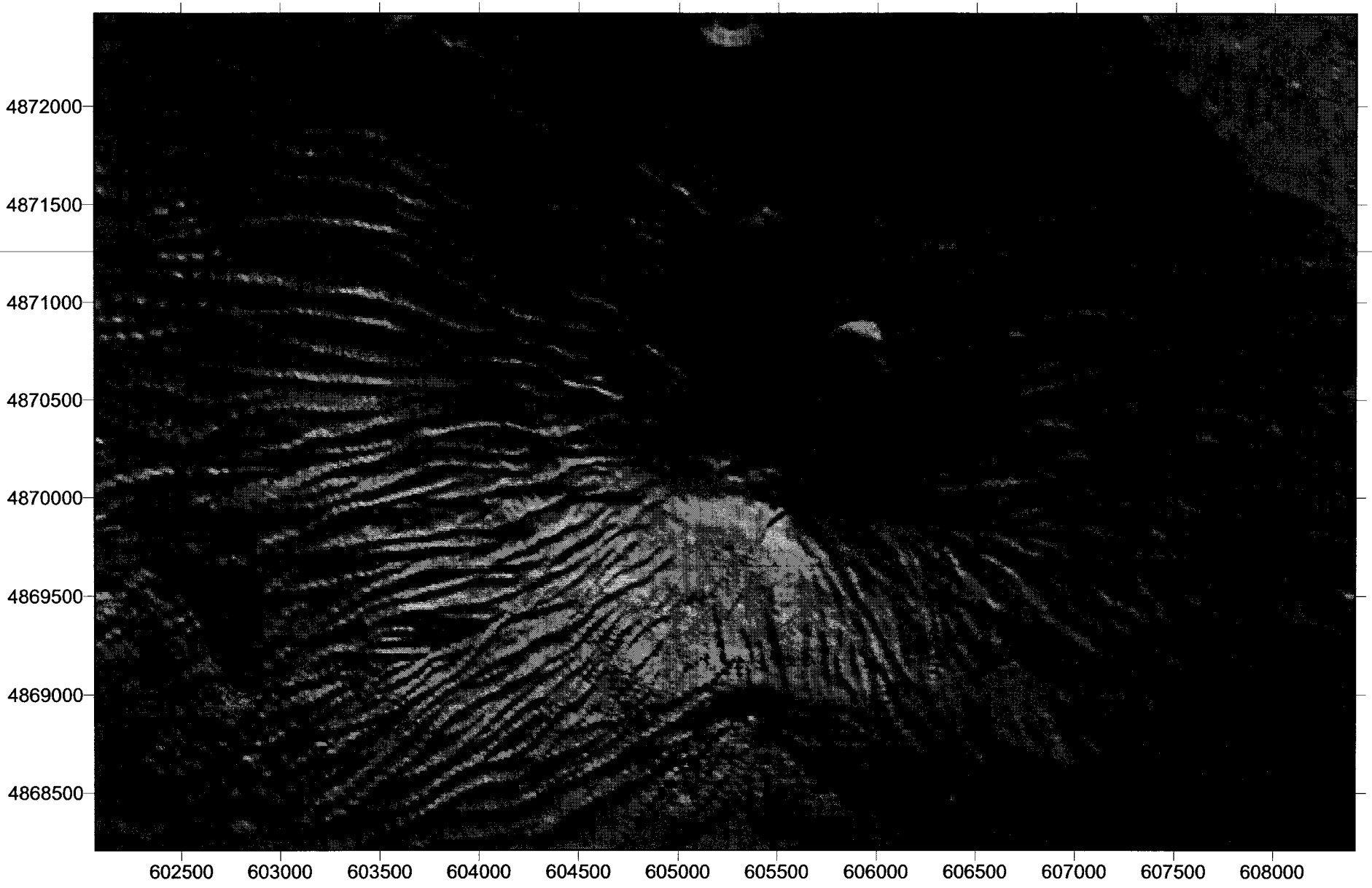
G302 Final Quiz; Task 1B
Mt Bachelor Contour Map (CI = 20 m)



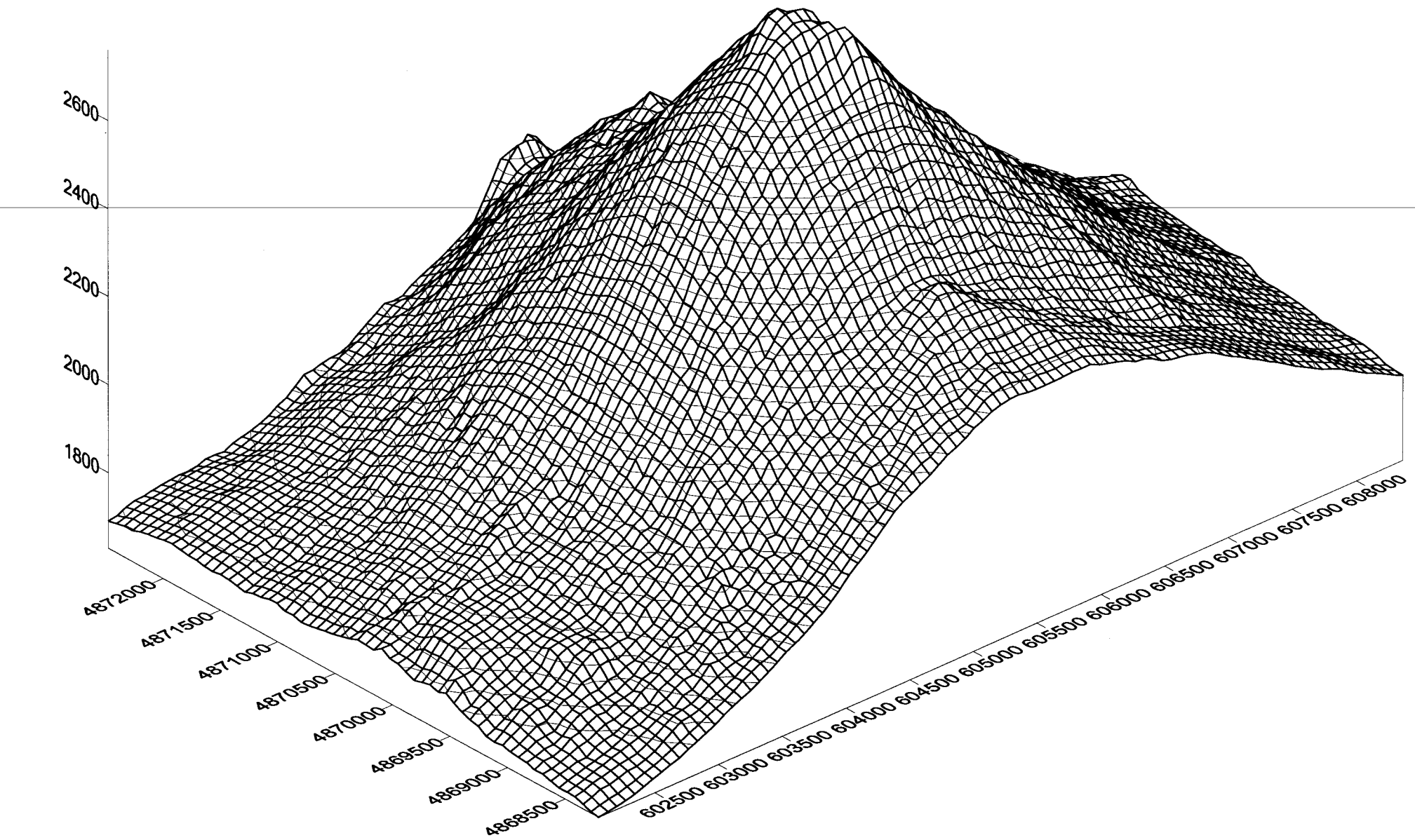
G302 Final Quiz; Task 1C
Mt Bachelor Shaded Relief Map (Sun Az = 335; Inclination = 45)



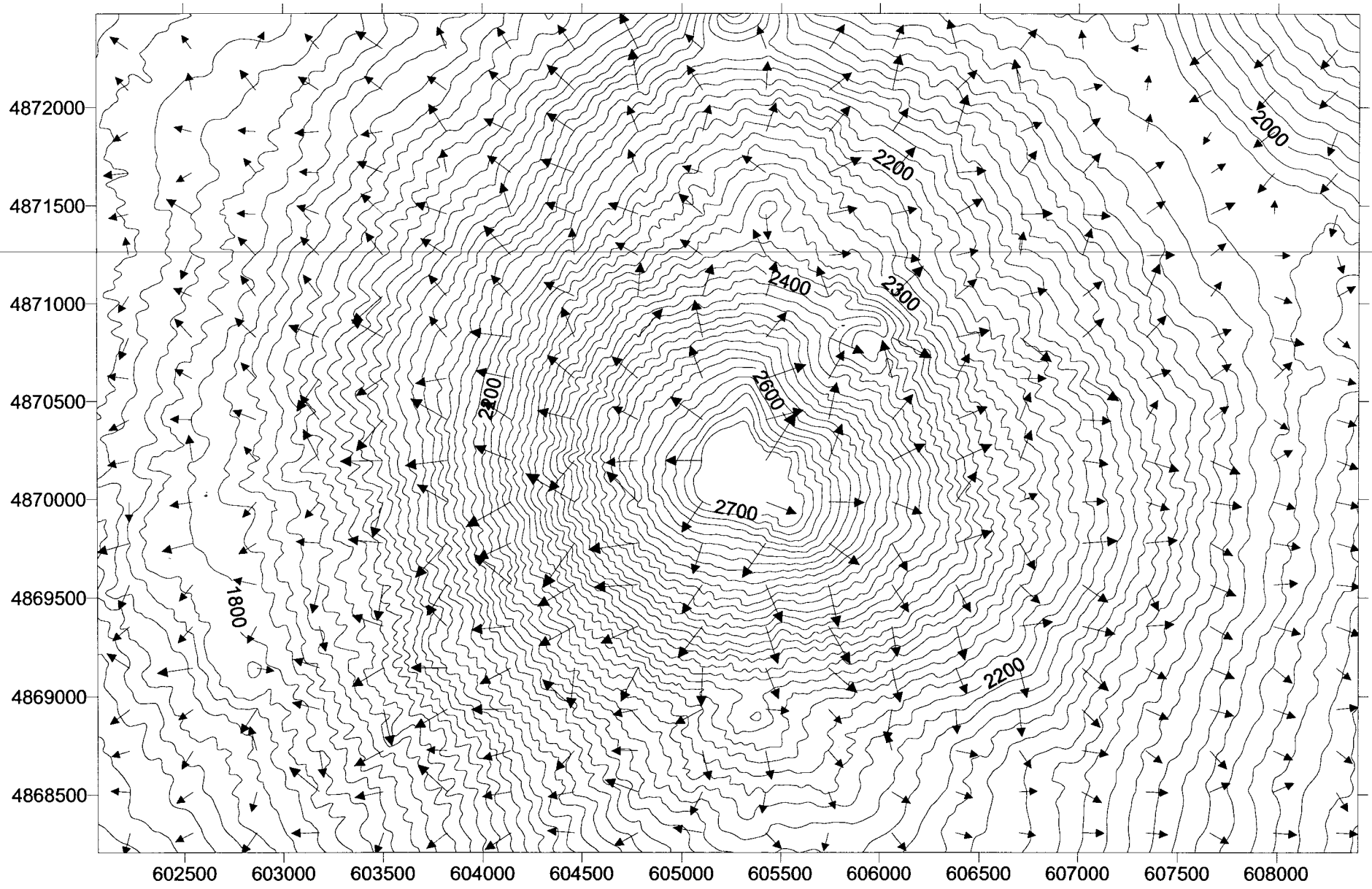
G302 Final Quiz; Task 1D
Mt Bachelor Shaded Relief Map (Sun Az = 200; Inclination = 30)



G302 Final Quiz; Task 1E
Mt Bachelor Wireframe (Vertical Exaggeration = x3)

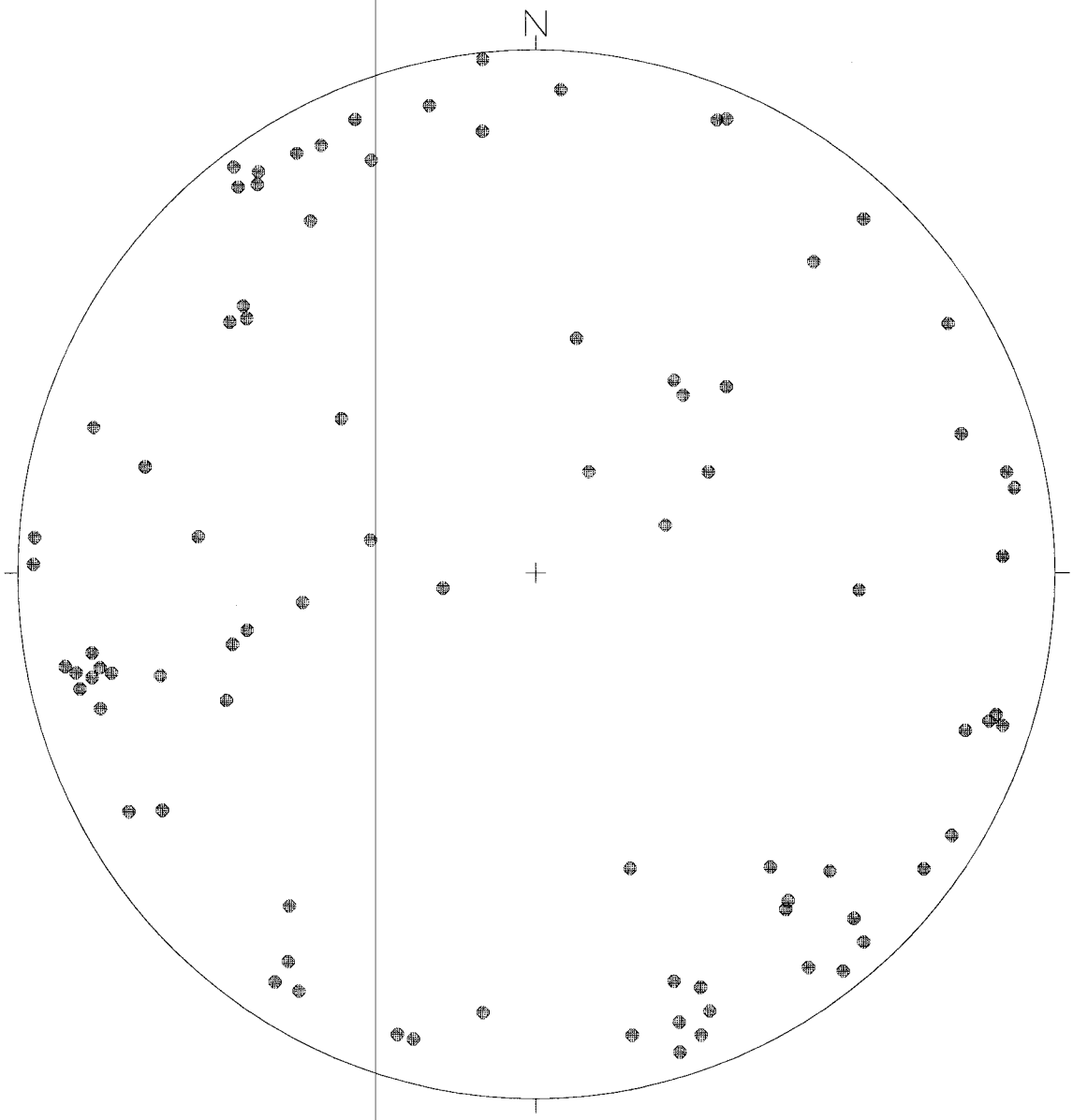


G302 Final Quiz; Task 1F
Mt Bachelor Contour / Vector Map (CI = 20 m)

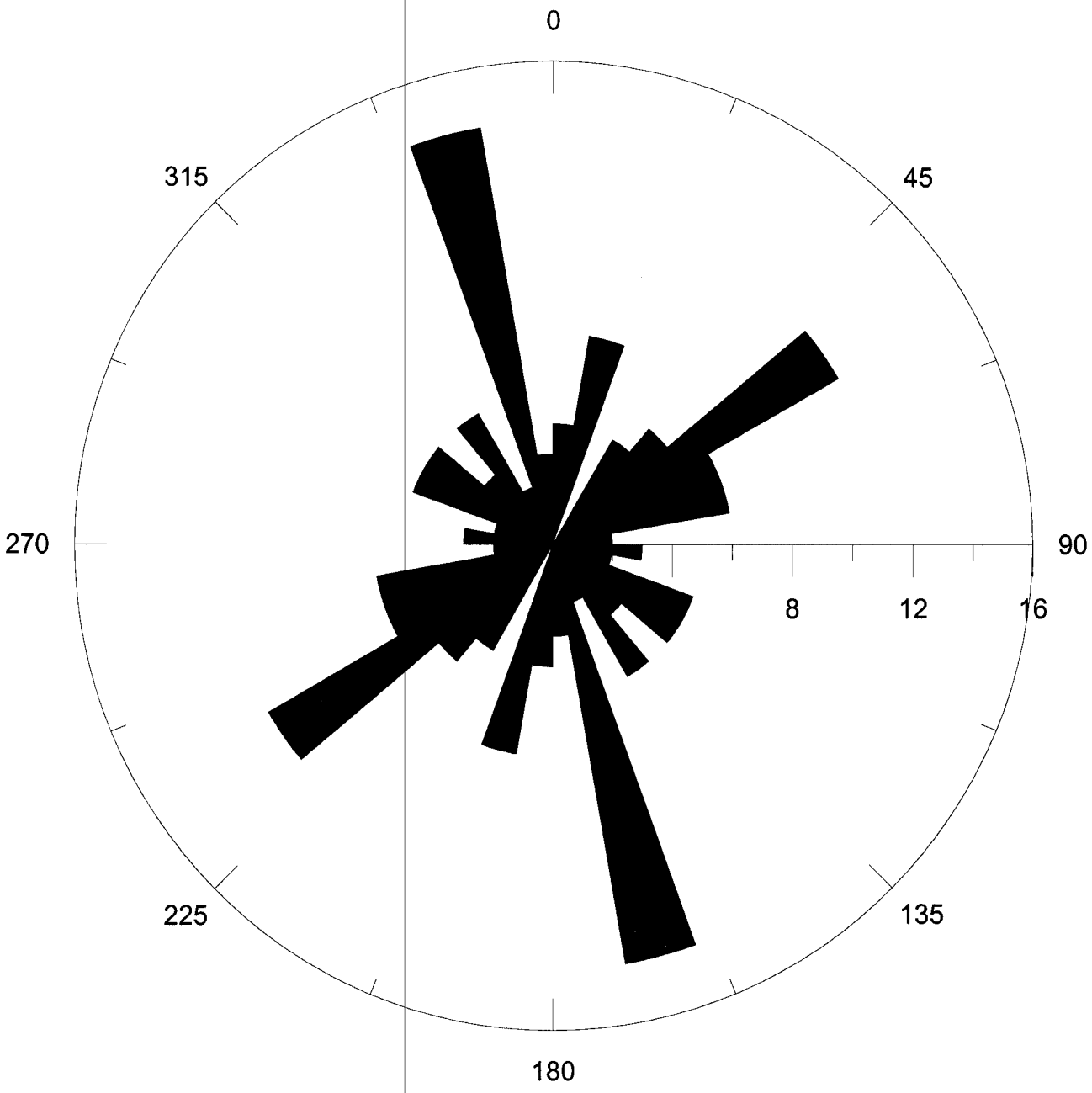


G302 FINAL TAKE-HOME

TASK 2 POLES TO FRACTURES

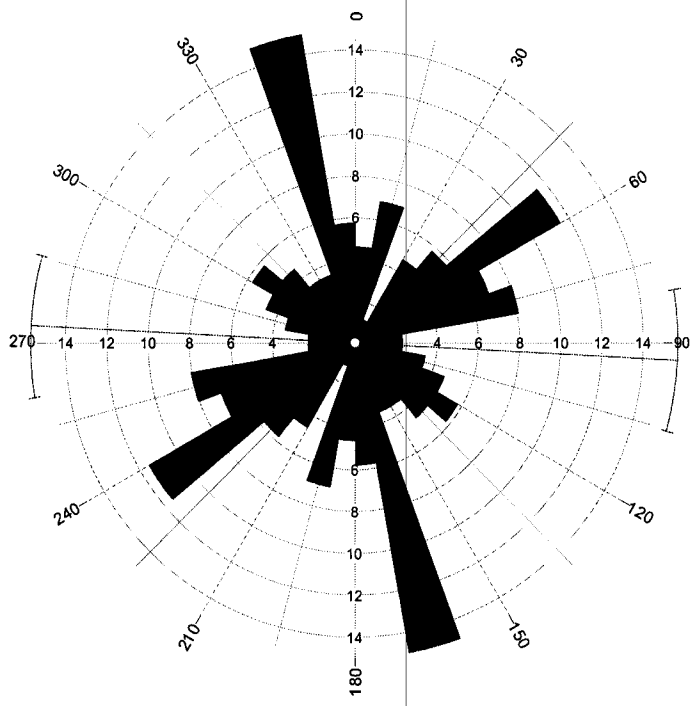


Task 3 Rose Diagram with Grapher
G302 Final Quiz



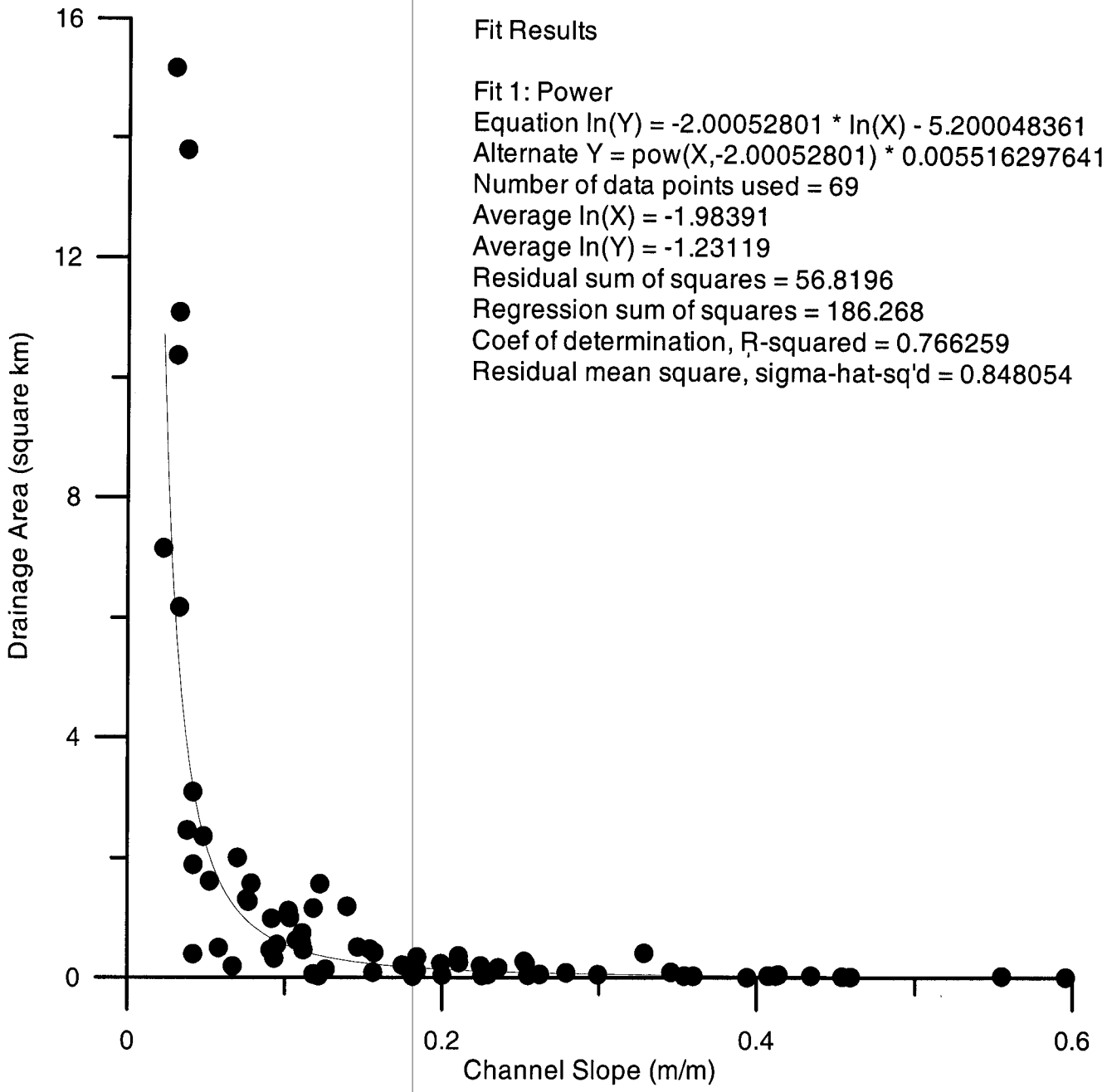
G 302

TASK 3A ROSE DIAGRAM WITH FOCKWORKS



Calculation Method	Frequency
Class Interval	10 Degrees
Length Filtering	Deactivated
Azimuth Filtering	Deactivated
Data Type	Bidirectional
Population	87
Maximum Percentage	14.9 Percent
Mean Percentage	5.6 Percent
Standard Deviation	3.3 Percent
Vector Mean	273 Degrees
Confidence Interval ...	12.39 Degrees
R-mag	0.61

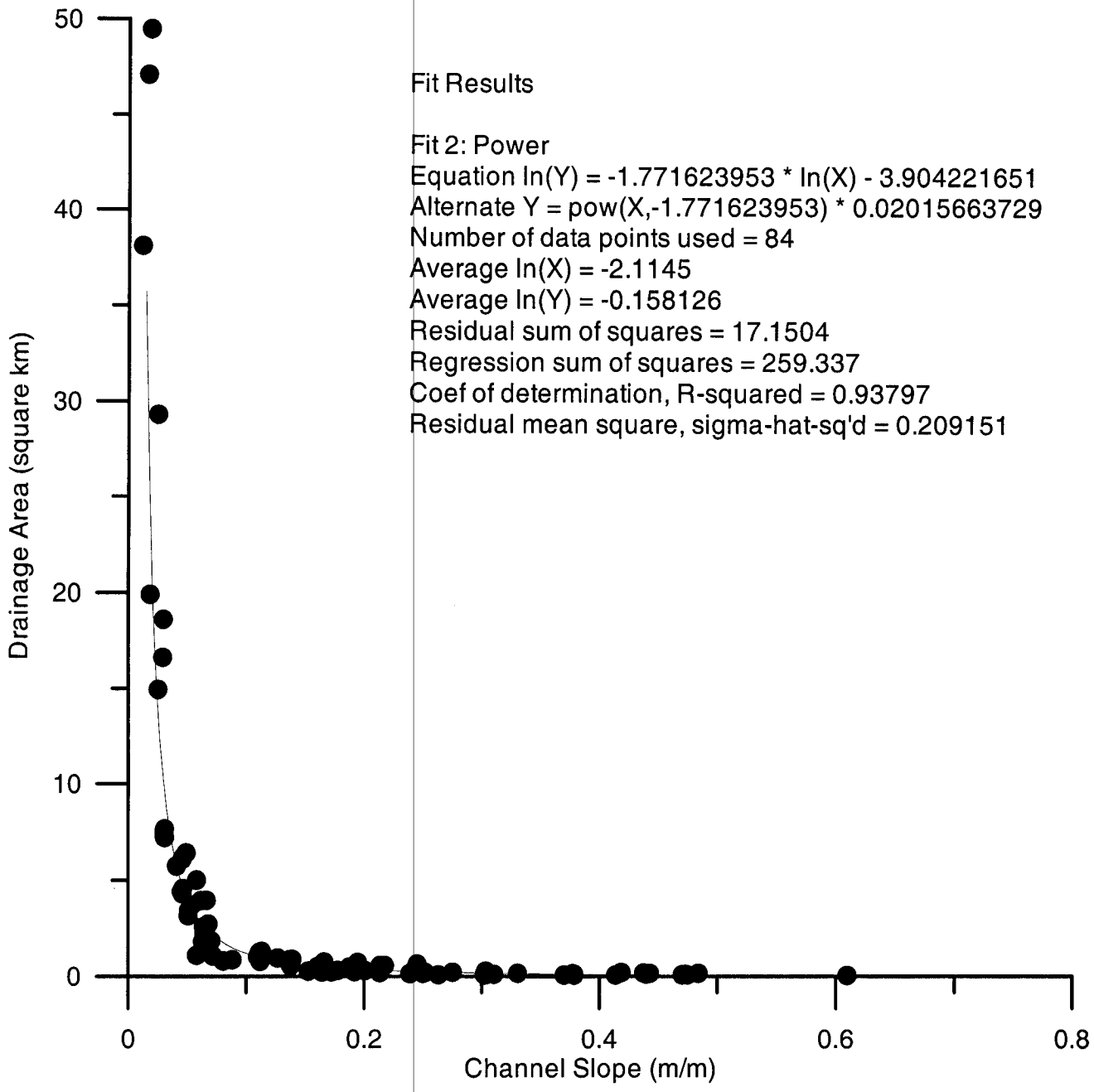
G302 Final Quiz - Task 4
Fernow Drainage Area vs. Channel Slope



Fit Results

Fit 1: Power
Equation ln(Y) = -2.00052801 * ln(X) - 5.200048361
Alternate Y = pow(X,-2.00052801) * 0.005516297641
Number of data points used = 69
Average ln(X) = -1.98391
Average ln(Y) = -1.23119
Residual sum of squares = 56.8196
Regression sum of squares = 186.268
Coef of determination, R-squared = 0.766259
Residual mean square, sigma-hat-sq'd = 0.848054

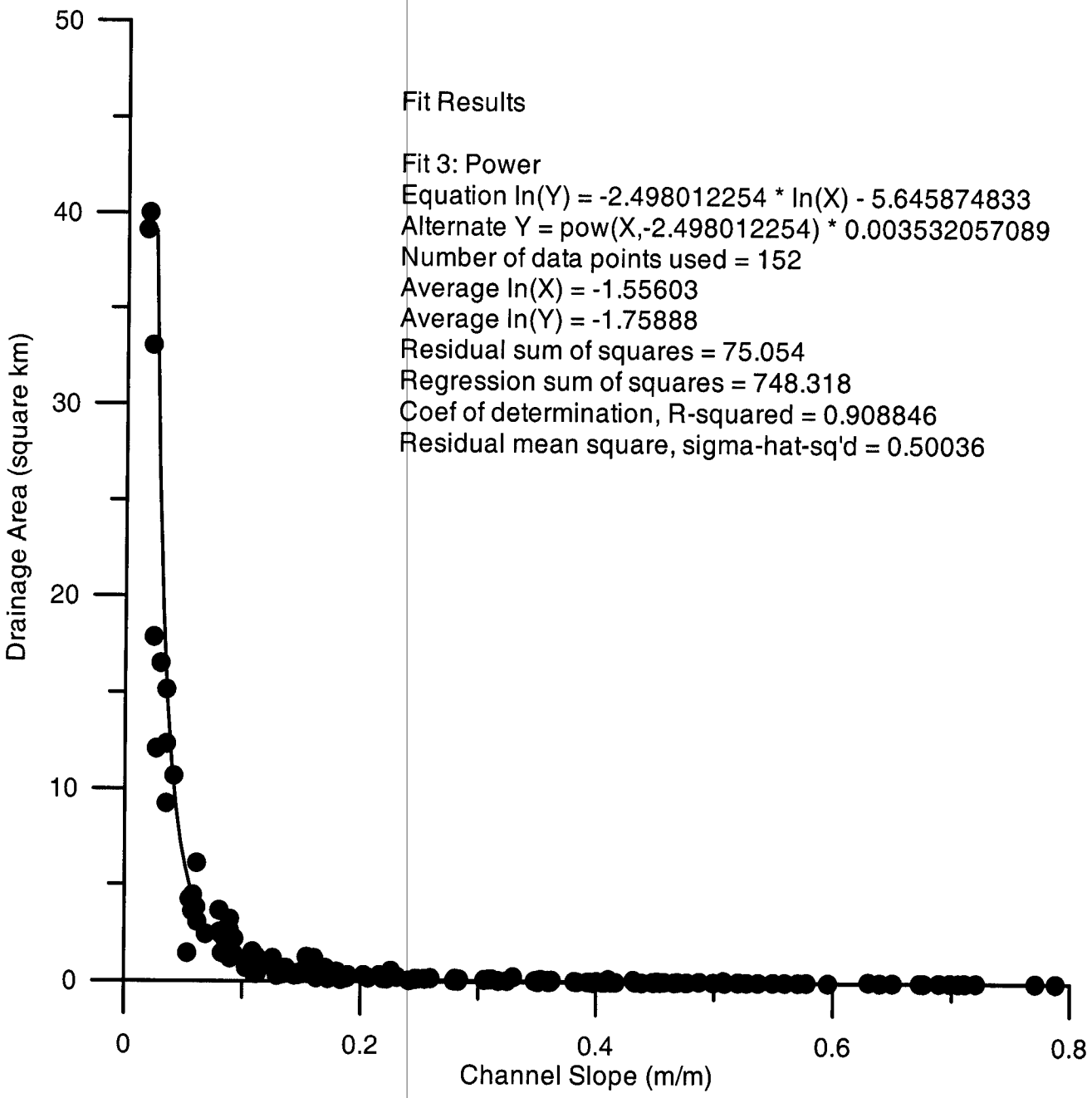
G302 Final Quiz - Task 4
North Fork Drainage Area vs. Channel Slope



Fit Results

Fit 2: Power
Equation ln(Y) = -1.771623953 * ln(X) - 3.904221651
Alternate Y = pow(X,-1.771623953) * 0.02015663729
Number of data points used = 84
Average ln(X) = -2.1145
Average ln(Y) = -0.158126
Residual sum of squares = 17.1504
Regression sum of squares = 259.337
Coef of determination, R-squared = 0.93797
Residual mean square, sigma-hat-sq'd = 0.209151

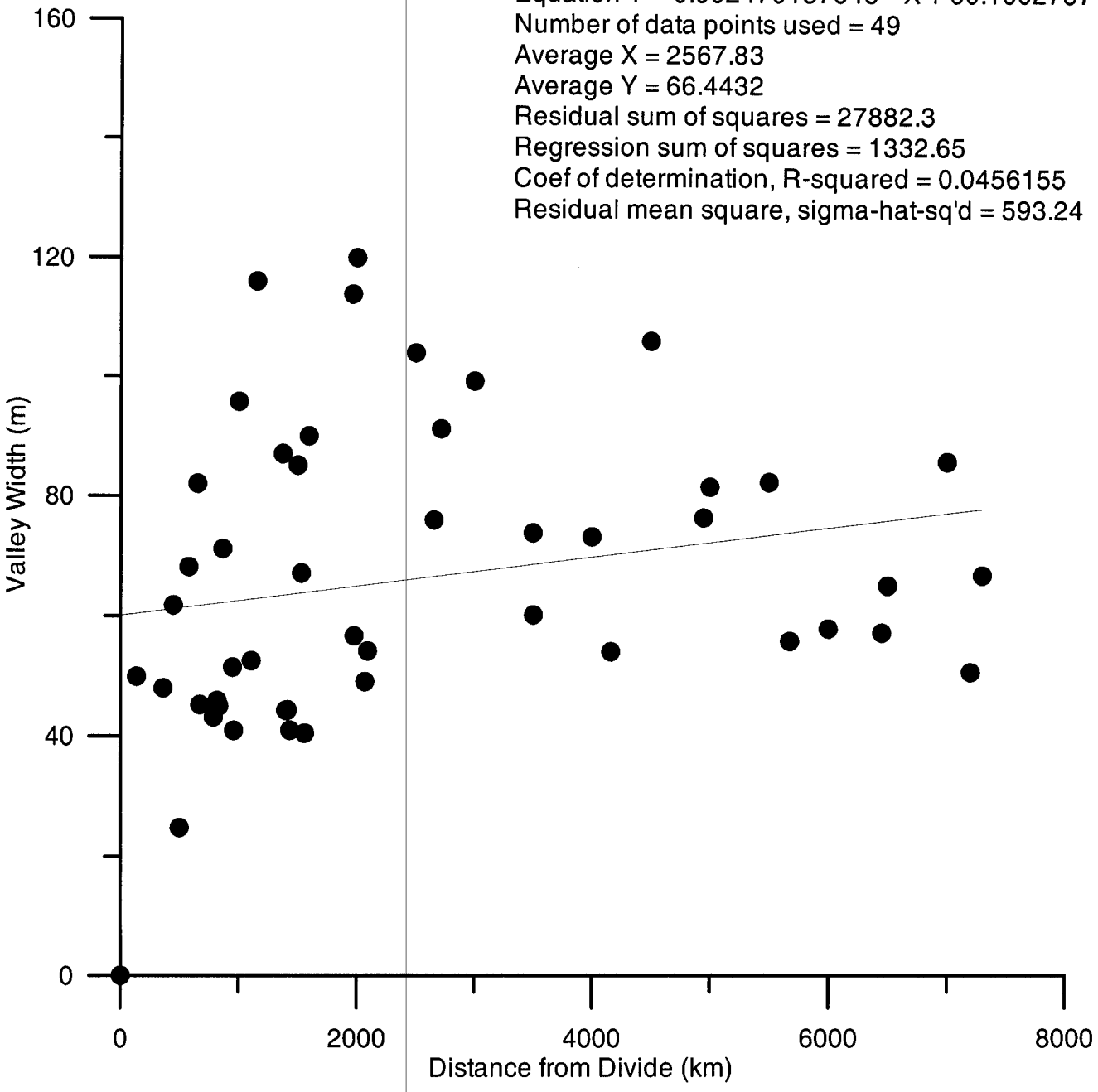
G302 Final Quiz - Task 4
Little River Drainage Area vs. Channel Slope



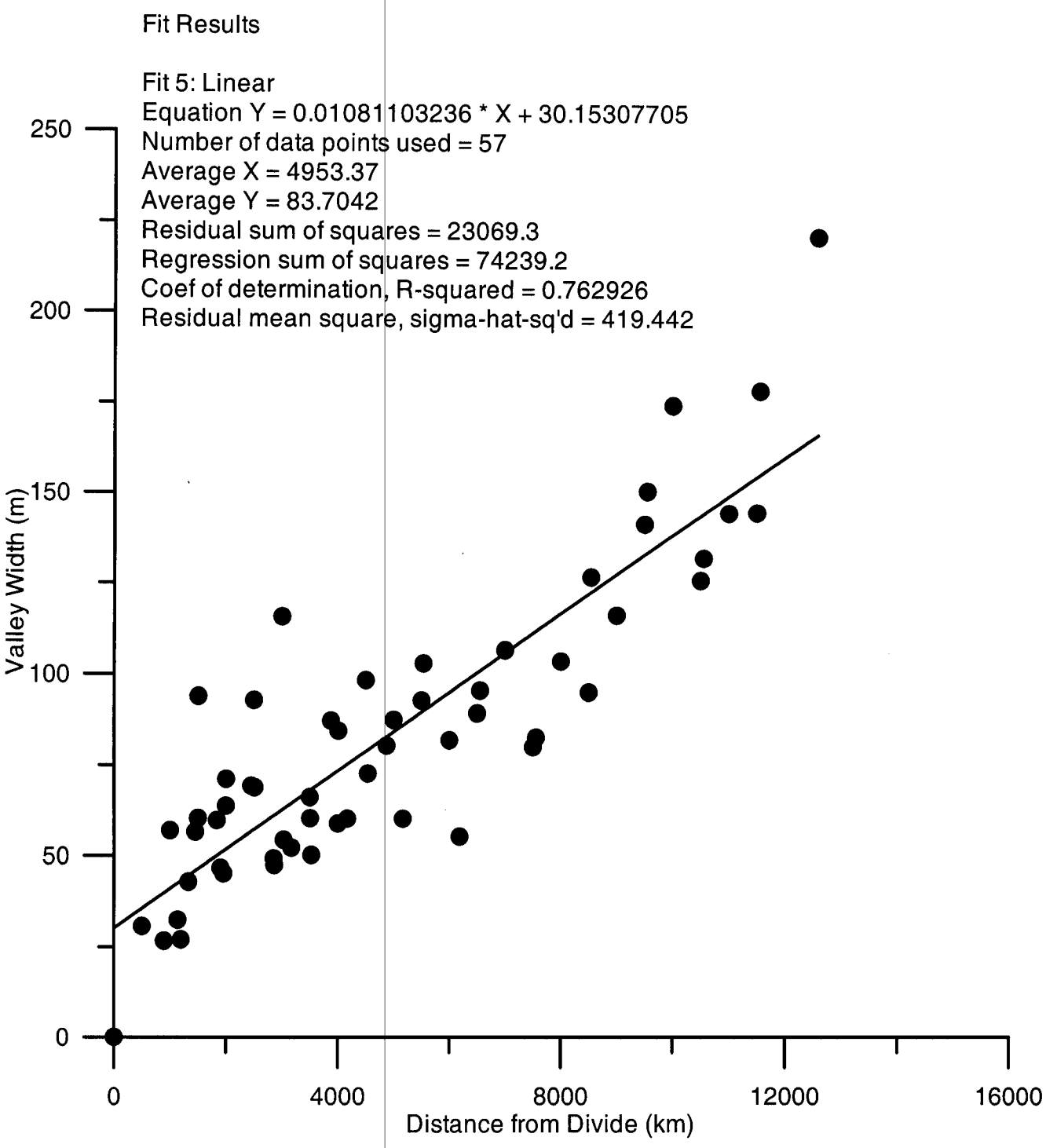
G302 Final Quiz - Task 4
Fernow Valley Width vs. Distance from Divide

Fit Results

Fit 4: Linear
Equation Y = 0.002470137648 * X + 60.10027571
Number of data points used = 49
Average X = 2567.83
Average Y = 66.4432
Residual sum of squares = 27882.3
Regression sum of squares = 1332.65
Coef of determination, R-squared = 0.0456155
Residual mean square, sigma-hat-sq'd = 593.24



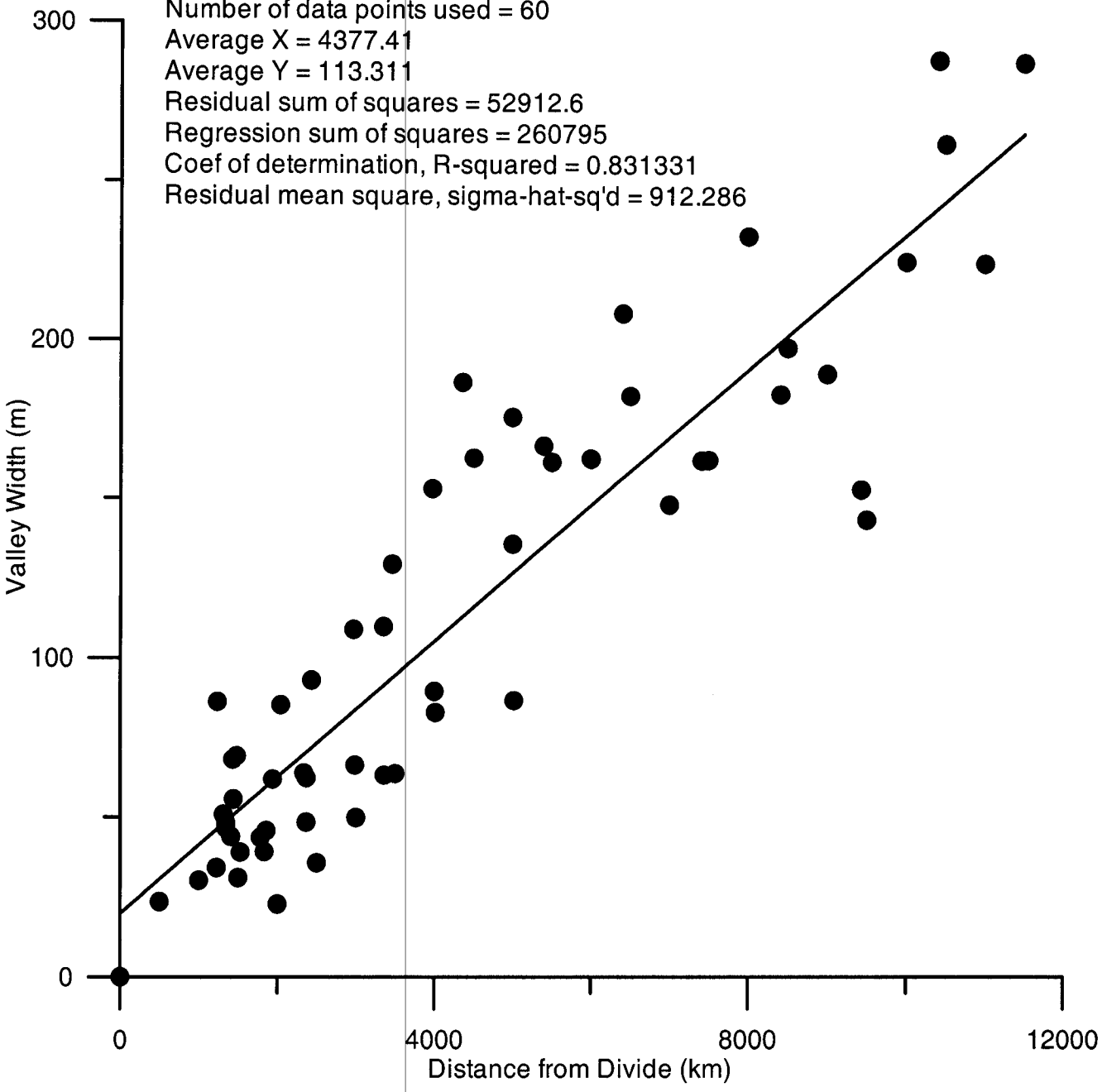
G302 Final Quiz - Task 4
North Fork Valley Width vs. Distance from Divide



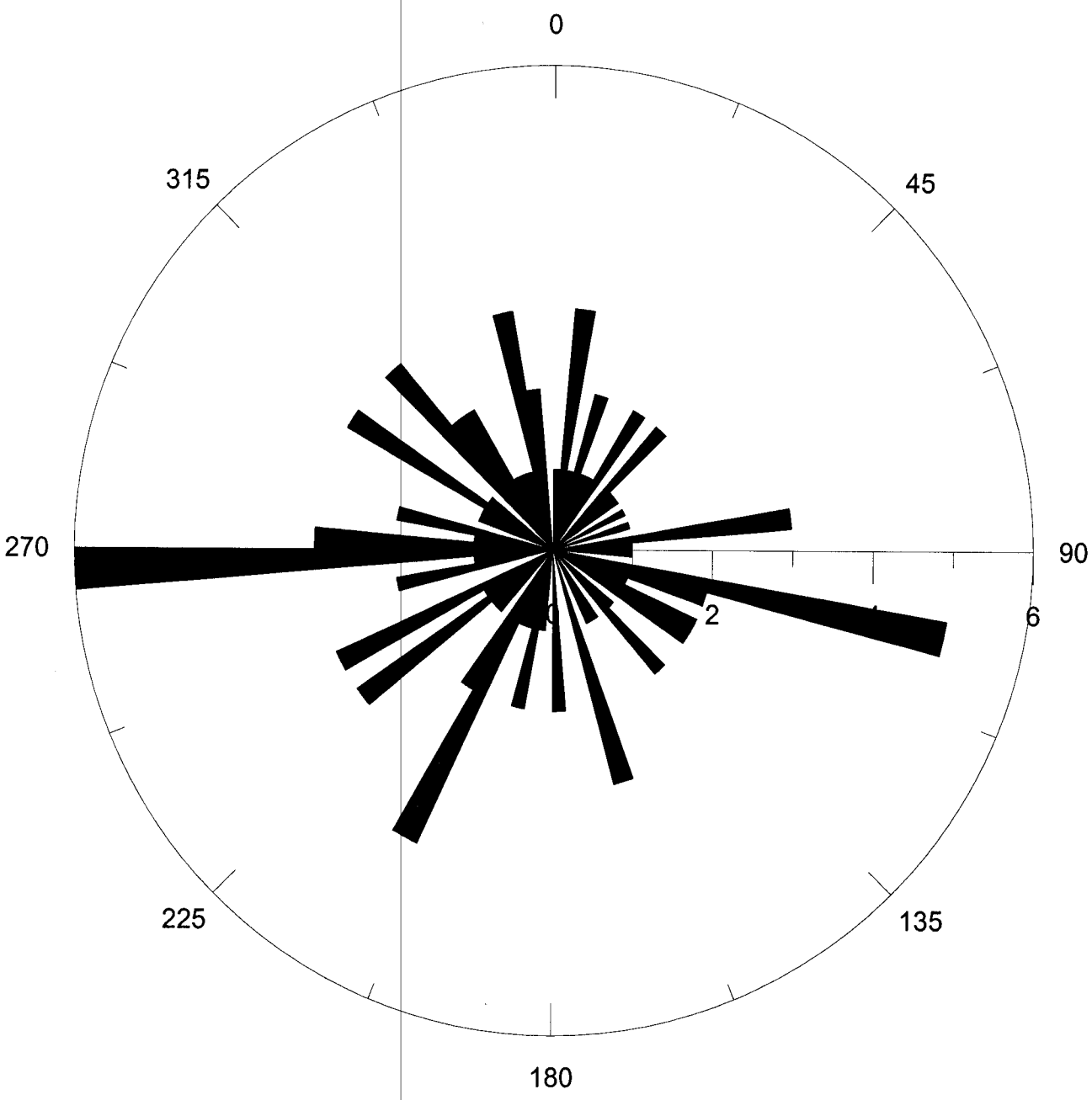
G302 Final Quiz - Task 4
Little River Valley Width vs. Distance from Divide

Fit Results

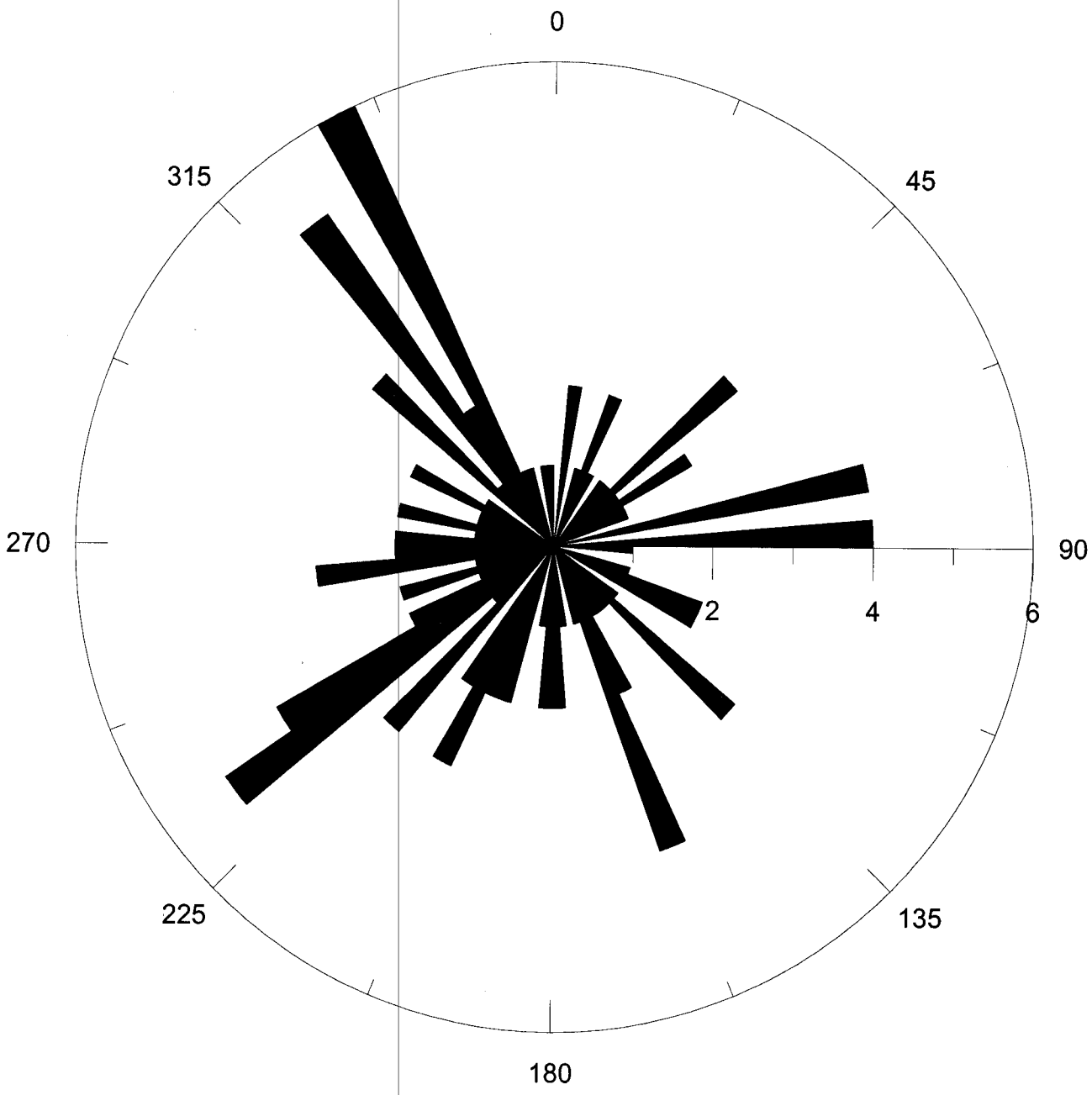
Fit 6: Linear
Equation Y = 0.02133234923 * X + 19.93010079
Number of data points used = 60
Average X = 4377.41
Average Y = 113.311
Residual sum of squares = 52912.6
Regression sum of squares = 260795
Coef of determination, R-squared = 0.831331
Residual mean square, sigma-hat-sq'd = 912.286



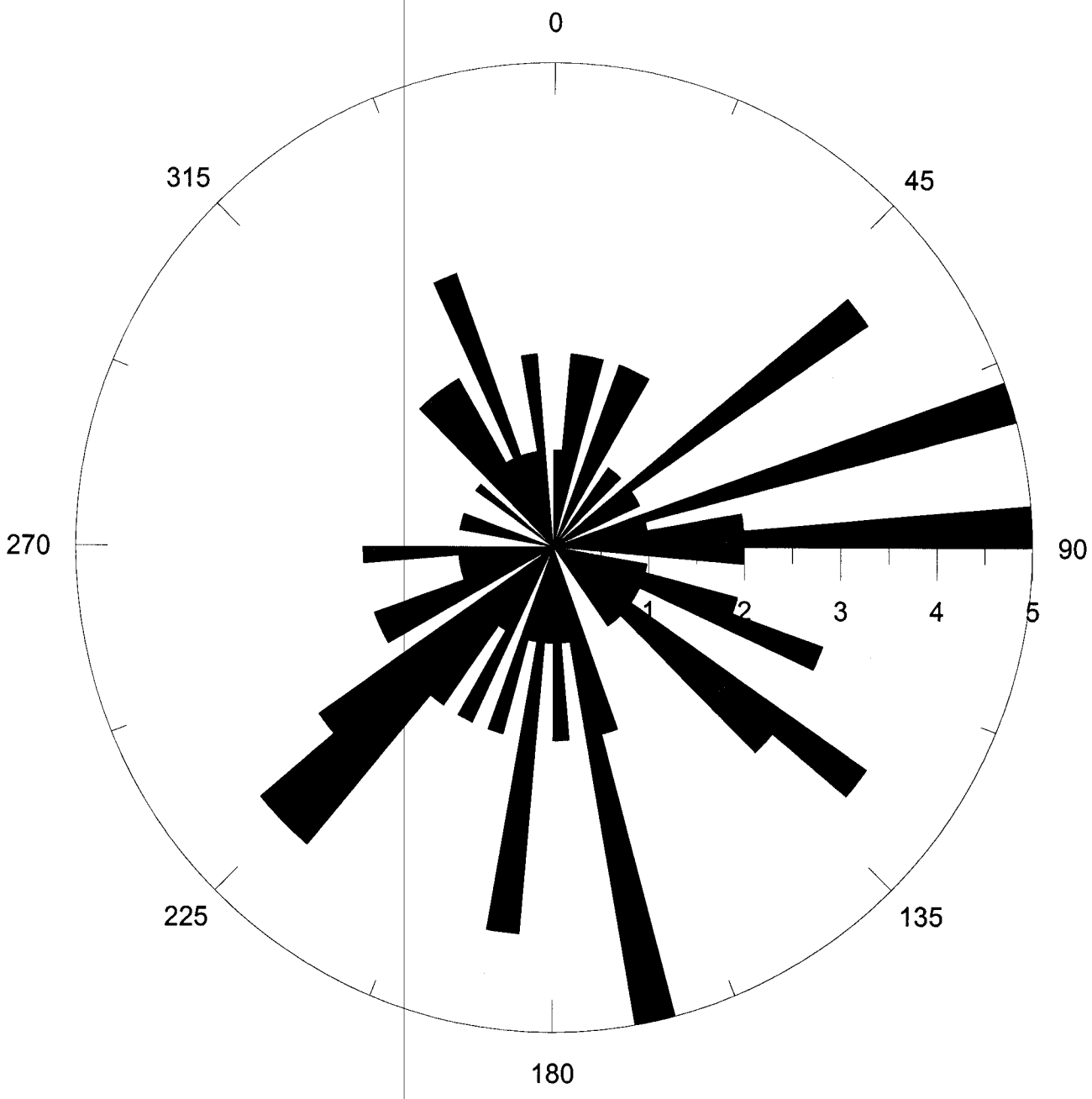
G302 Final Quiz Task 4 - Rose Diagram of Hillslope Aspect - Fernow



G302 Final Quiz Task 4 - Rose Diagram of Hillslope Aspect - North Fork

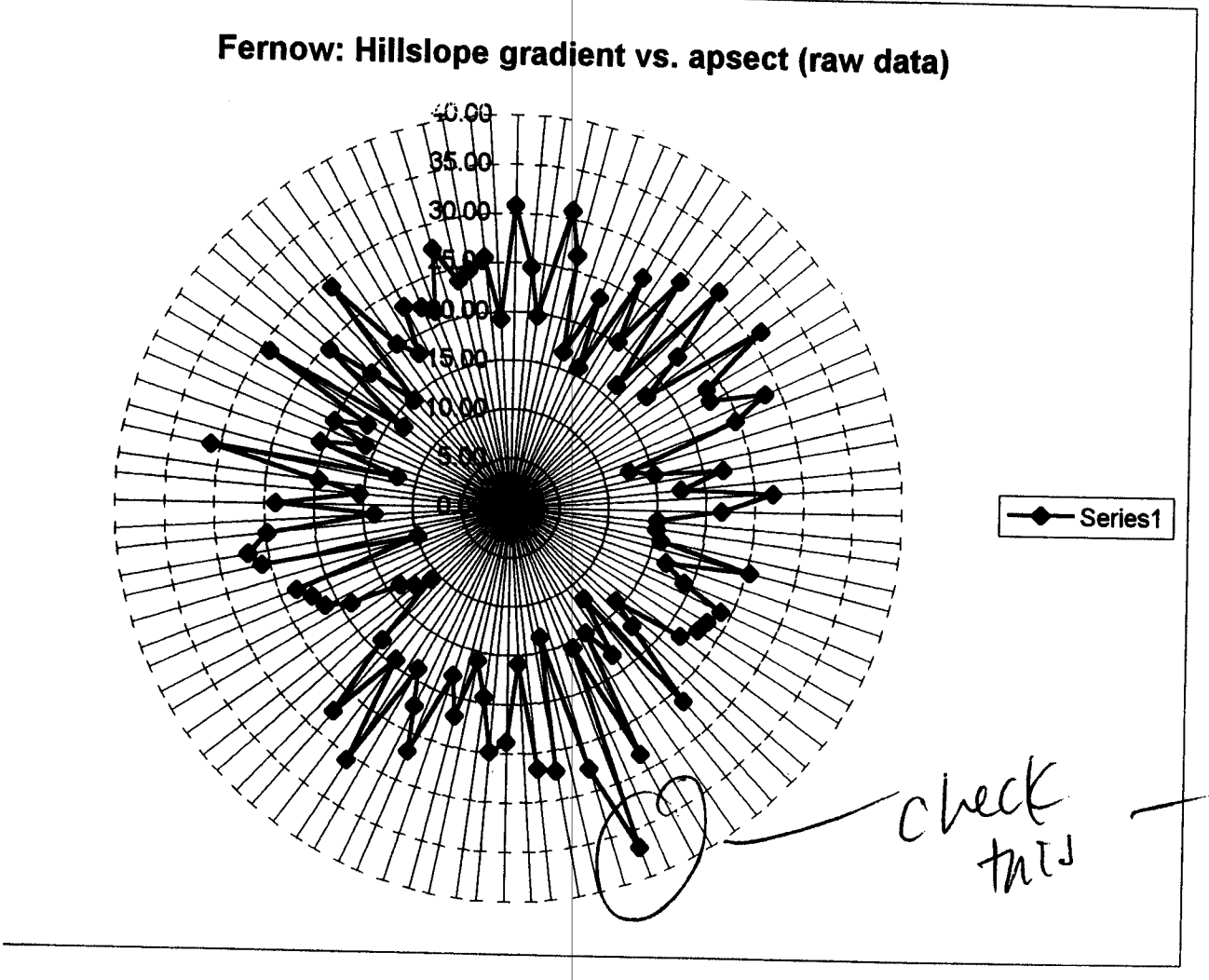


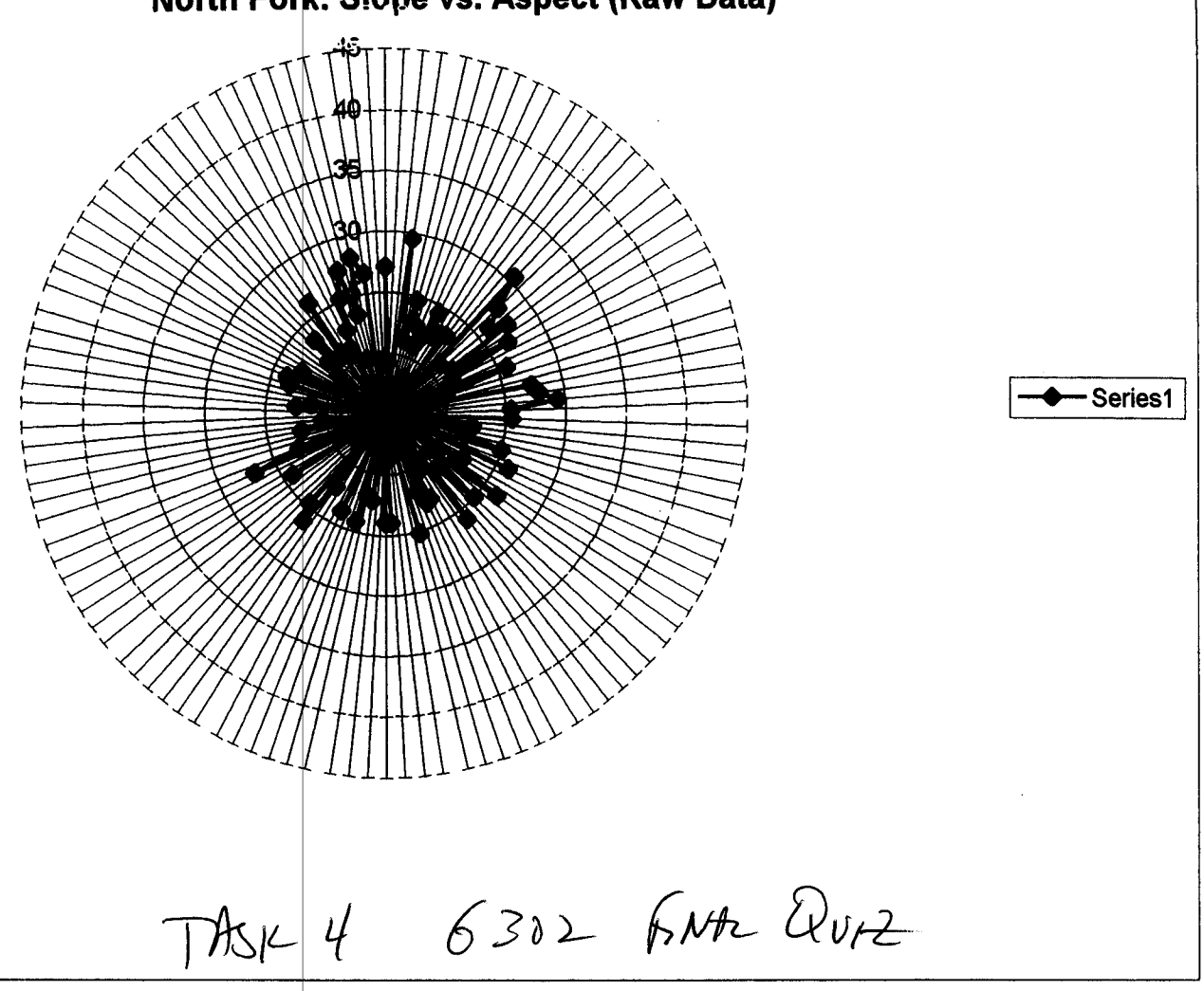
G302 Final Quiz Task 4 - Rose Diagram of Hillslope Aspect - Little River



hillslop

JACK 4 6302 FINAL QUIZ



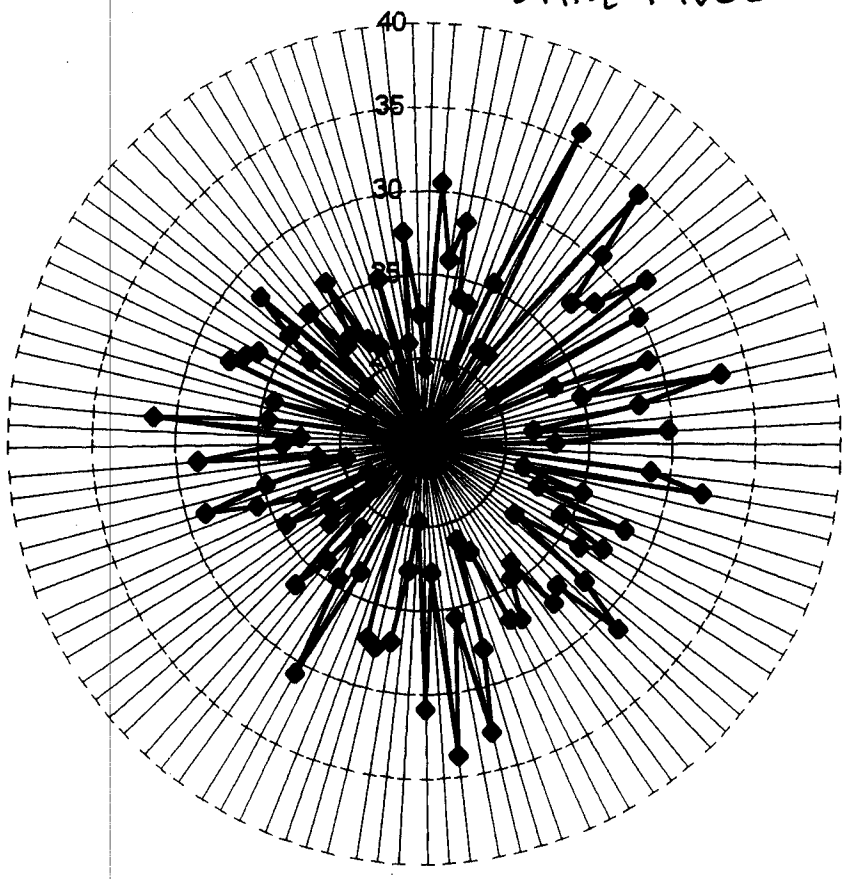


TASK 4 6302 FINAL QUIZ

TASK 4 6302 FINAL QUIZ

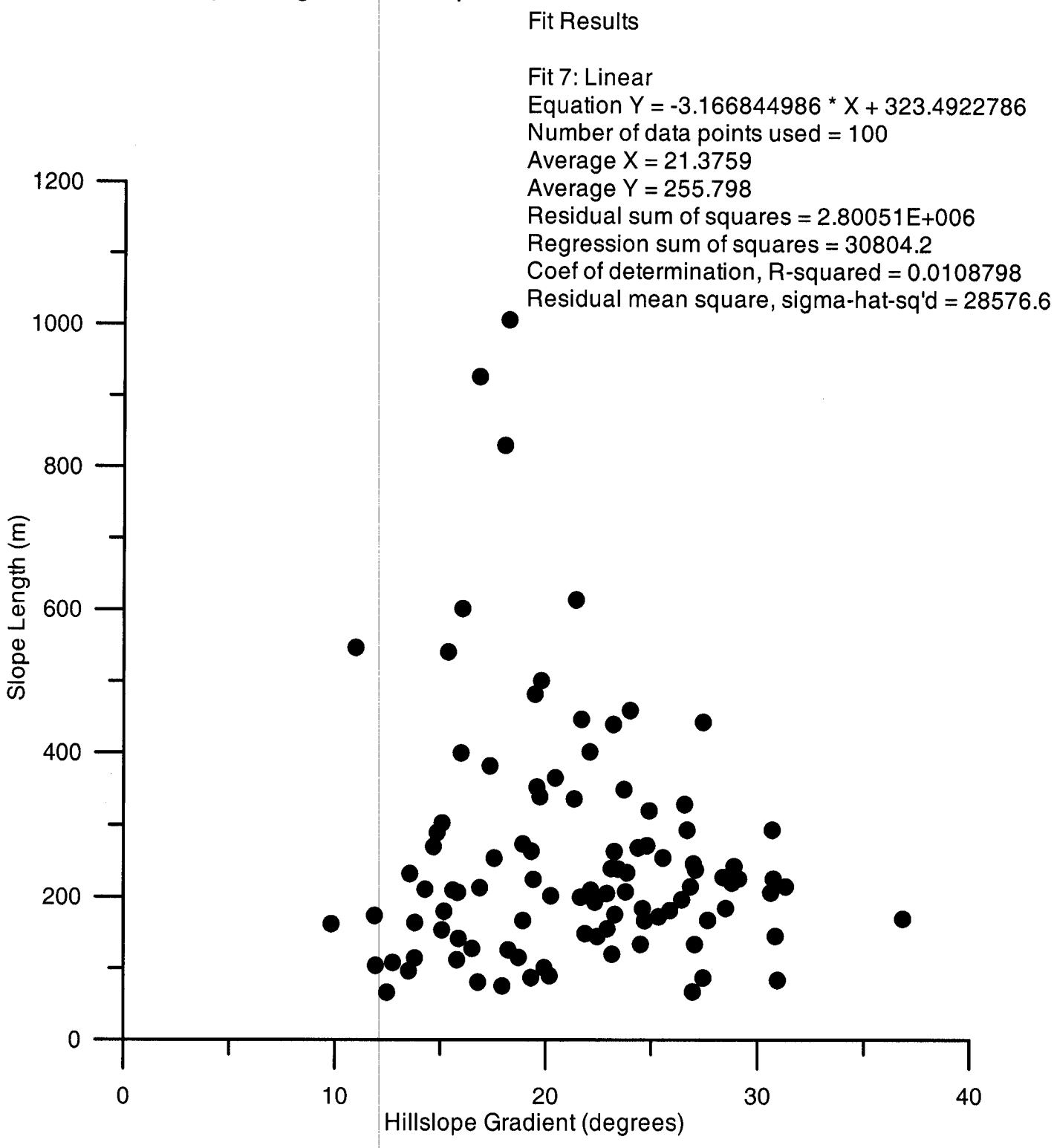
Slope vs. Aspect (Raw Data)

LITTLE RIVER



G302 Final Quiz - Task 4

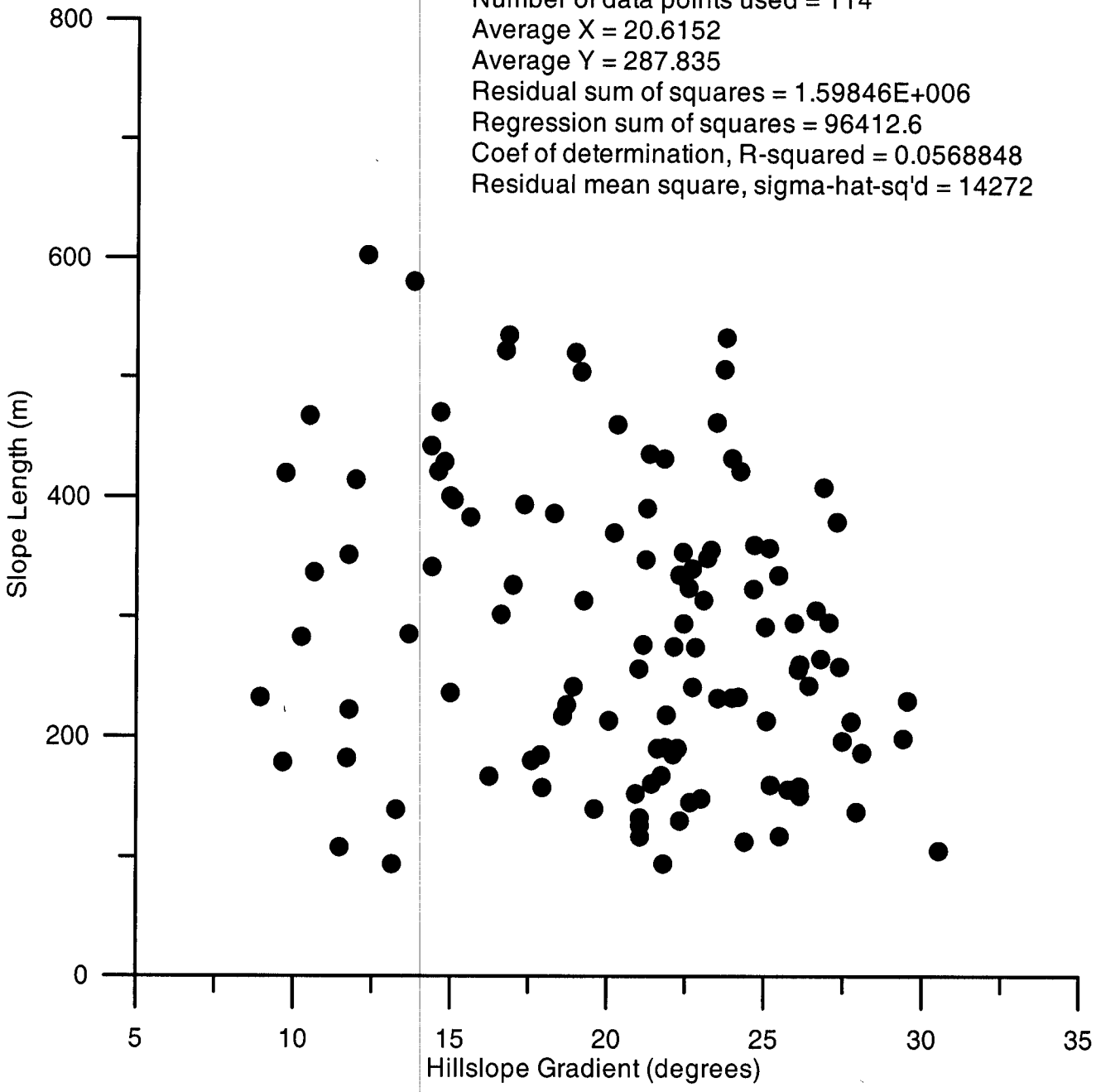
Fernow Slope Length vs. Hillslope Gradient



G302 Final Quiz - Task 4
North Fork Slope Length vs. Hillslope Gradient

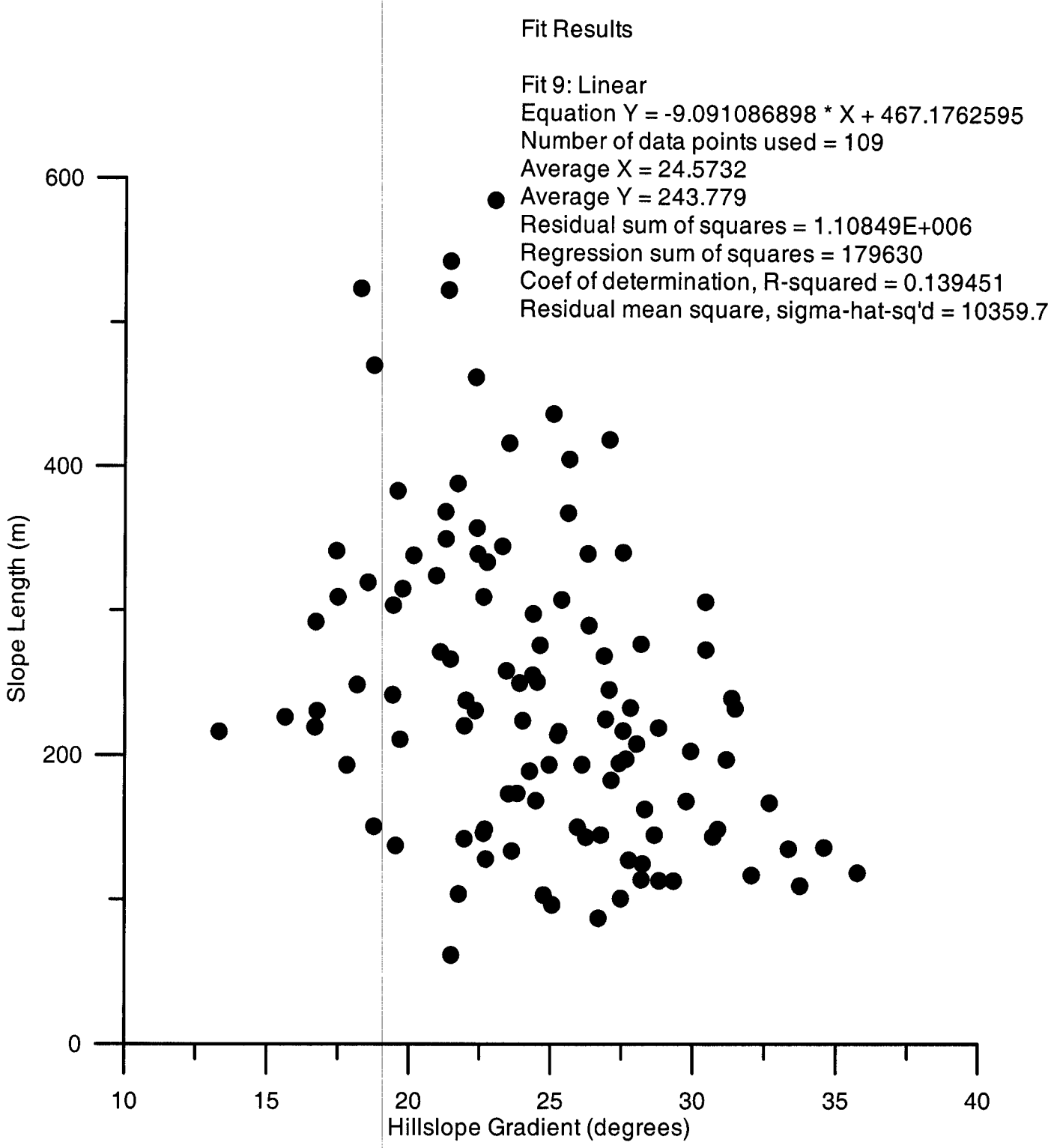
Fit Results

Fit 8: Linear
Equation Y = -5.62282225 * X + 403.7499516
Number of data points used = 114
Average X = 20.6152
Average Y = 287.835
Residual sum of squares = 1.59846E+006
Regression sum of squares = 96412.6
Coef of determination, R-squared = 0.0568848
Residual mean square, sigma-hat-sq'd = 14272



G302 Final Quiz - Task 4

Little River Slope Length vs. Hillslope Gradient



G302 Final Project Statistical Summary Task 4

	Slope_Length_meters	Nfork Slope_DecDeg	Val Width	Slope_Length_meters	Fernow Slope_DecDeg	Val Width	Slope_Length_meters	Lriv Slope_DecDeg	Val Width
Max	602.8	30.5	220.9	1007.7	36.8	120.0	585.8	35.8	288.3
Min	94.0	8.9	0.0	66.2	9.8	0.0	61.9	13.3	0.0
Range	508.8	21.6	220.9	941.6	27.0	120.0	523.9	22.4	288.3
Stdev	122.5	5.2	41.7	169.1	5.6	24.7	109.2	4.5	72.9
Variance	14998.9	27.0	1737.7	28599.1	31.0	608.6	11927.1	20.1	5317.1
Mean	287.8	20.6	83.7	255.8	21.4	66.4	243.8	24.6	113.3
Median	275.5	21.8	80.0	211.9	21.7	61.8	225.4	24.5	88.2
25th Per	186.3	16.9	56.6	155.2	16.8	49.1	150.3	21.5	49.5
No.	114	114	57	100	100	49	109	109	60