

Statistics Linear Regression Midterm Exam StatCrunch Assignment

Due 3-21-24 by 11:59 pm. NO LATE ASSIGNMENTS WILL BE ACCEPTED.

This assignment counts as 40% of your midterm exam grade.

1. (20 points) Use StatCrunch to find a linear regression model for the following set of data. x represents the starting balance of a bank account at the start of a month, in dollars. y represents the ending balance at the end of the month. Each entry in the table represents a randomly chosen customer.

| x | y |
|------|-------|
| 49.8 | 72.3 |
| 41 | 69.4 |
| 40.6 | 95.2 |
| 34 | 72.5 |
| 82.1 | -21.5 |
| 41.1 | 59.9 |
| 32.6 | 65.1 |
| 36.4 | 63.1 |
| 29.3 | 75.3 |
| 25.9 | 93.3 |
| 38.3 | 119.2 |
| 61.8 | 2.7 |

- a. Have StatCrunch calculate the regression line equation. Use Stat > Regression > Simple Linear and indicate the x and y variables. Compute using the rest of the defaults. The first result page gives the equation, r and r -squared (plus other advanced results).

Find the correlation coefficient, r , rounded to 3 decimal places. Is this linear model a good fit for the data? Explain.

- b. Based on the data, calculate the regression line and put it in the form $y = m x + b$. Round both m and b to 3 decimal places.

- c. For this part, DO NOT USE StatCrunch. Use your equation from part b to find the y value if $x = 52.82$. What does the ordered pair $(52.82, y)$ mean in the context of this example. **Please explain.**

2. (30 points)

A random sample of 16 Americans yielded the following data on age (in years) and peak heart rate (beats per minute):

| | | | | | | |
|----------|-----|-----|-----|-----|-----|-----|
| Age (x) | 88 | 55 | 64 | 90 | 45 | 40 |
| Peak (y) | 137 | 167 | 146 | 135 | 172 | 170 |
| Age (x) | 67 | 75 | 81 | 48 | 89 | 80 |
| Peak (y) | 150 | 143 | 144 | 171 | 133 | 141 |
| Age (x) | 84 | 37 | 36 | 25 | | |
| Peak (y) | 130 | 182 | 185 | 201 | | |

In StatCrunch:

Enter age in the first column and beats per minute (bpm) in the second column. Be sure that the x and y values match across the columns. Name the columns and save your data.

Create a scatter plot with Graph > ScatterPlot. Make the x column age and the y column bpm. Enter labels for the x -axis and y -axis. Compute and save the plot.

Question #1: Does a linear regression line seem appropriate? Please explain.

Have StatCrunch calculate the regression line equation. Use Stat > Regression > Simple Linear and indicate the x and y variables. Compute using the rest of the defaults. The first result page gives the equation, r and r-squared (plus other advanced results). The second result page draws the regression line through the data. Save them both for your report.

Question #2: Using the equation calculated by StatCrunch, predict the average peak heart rate for a 30-year-old. Repeat for an 80-year-old. Round your answers to the nearest tenth and include the units.

Question #3: What does the slope of the equation represent? (Be specific and include the units for the change in y and change in x for this data.)

Question #4: Give the r value and explain what it means for this data.

Create a report of the scatterplot, the linear regression information, and page two which is the scatterplot with the line drawn through the data. Turn in your report from StatCrunch along with the answers to the questions above.