St. Joseph's University
Date: March 6, 2025 Professor: Asher Roberts

Statistics Test 2

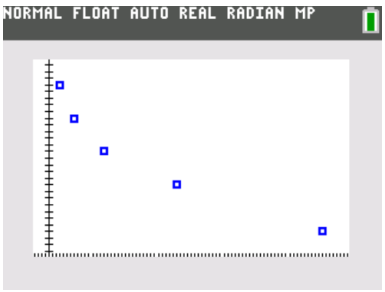
Number of questions—3

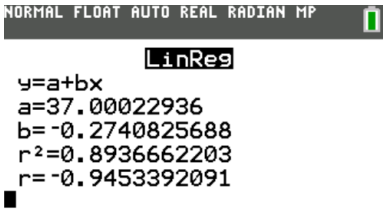
Directions: Solve each of the following problems using separate paper, while clearly indicating each problem number when solving. Irrelevant work will detract from your score, while answers without work shown will be awarded no credit. Answers with partially correct work will receive partial credit. Unless otherwise specified, round all answers to 3 decimal places when necessary. You must work alone, but you may use a graphing calculator as a supplement to your own work if you indicate the steps used. You may not use a phone, computer, computational intelligence, AI, or other tools to assist you in solving the problems.

1. The following data are based on information from *Domestic Affairs*. Let x be the average number of employees in a group health insurance plan, and let y be the average administrative cost as a percentage of claims.

x	3	7	15	35	75
y	40	35	30	25	18

A calculator was used to produce a scatter plot and regression equation.





(a) (*8 pts*) Describe the association between the variables based on the scatter plot.

(b) (*8 pts*) What is the correlation coefficient and how does it help justify the association you described?

(c) (*8 pts*) What is the equation of the least-squares line?

(d) (*8 pts*) Use the equation of the least-squares line to predict the average administrative cost when the average number of employees is 40.

(e) (*8 pts*) What kind of prediction did you just make?

(f) (*8 pts*) What percentage of the variation in the average administrative cost can be explained by the average number of employees?

2. Mark, Dylan, Helly, Irving, and Burt all work in an office. All workers are equally likely to be chosen for assignments and rewards. Workers can only be chosen for an assignment once, but they can be chosen for rewards multiple times.

   (a) (*7 pts*) If one worker is needed for a special assignment, what is the probability that Mark is chosen?

   (b) (*7 pts*) If one worker is needed for a special assignment, what is the probability that Mark or Helly is chosen?

   (c) (*7 pts*) If instead two workers are needed for the assignment, what is the probability that Mark is chosen first, and then Helly is chosen second?

   (d) (*7 pts*) If there are two rewards to be given out, what is the probability that Dylan receives both of them?

3. Symptoms of a disease afflicting adults and children have the following prevalence:

	Symptomatic	Asymptomatic	Total
Adults	42	12	54
Children	8	38	46
Total	50	50	100

   (a) (*12 pts*) What is the probability that a child has the disease given they are asymptomatic?

   (b) (*12 pts*) What is the probability that someone with the disease is an adult or that they are symptomatic?