
Regression

1. Students in Ms. Garth's Algebra II class wanted to see if there are correlations between test scores and time spent watching television. The students created a table in which they recorded 13 student's average number of hours per week spent watching television and scores on a test. Use the actual data collected by the students in Ms. Garth's class, as shown in the table below, to answer the following questions.

TV hrs/week (average)	30	12	30	20	10	20	15	12	15	11	16	20	19
Test Scores	60	80	65	85	100	78	75	95	75	90	90	80	75

- a) Find the best fitting linear model that represents the data and the correlations coefficient.

$$y = -1.43x + 105.98 \quad r^2 = .6724$$

- b) Identify the y-intercept. What does it represent in the context of the problem?

$y\text{-int} = 105.98$ It represents the idea that someone who watched 0 hours of TV would be expected to get a 105.98%.

- c) Using this model, what is the estimated test score of a student who watches TV for 35 hours?

$$f(35) = 55.80$$

- d) Using this model, what is the highest number of hours a student can watch TV and still pass the test (make a 70)?

$$70 = -1.43x + 105.98$$

$$-35.98 = -1.43x \quad x = 25.16 \text{ hours}$$

2. The town planners designed a town for an optimal growth of 8% per year. Below is a table representing the growth (in thousands) from 1997 to 2003.

Year	Population
1997	50
1998	54
1999	58
2000	63
2001	68
2002	73.5
2003	79.3

- a) Find the best fitting exponential model that represents the data and the correlation coefficient.

- b) Using this model, what is the predicted population in the year 2017?

- c) Using this model, what was the estimated population in 1977?

- d) In what year will the population have doubled?
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This table shows the population of a city every ten years since 1970.

Years Since 1970 x	Population (in thousands) y
0	489
10	801
20	1,202
30	1,998
40	2,959

- Find the best-fitting quadratic model for the data. Round to 3 decimal places.
- Using this model, what will be the estimated population in 2020?

$$y = 1.209x^2 + 12.999x + 504.257$$

- Which of the following is best modeled by a **quadratic** function?
 - Relationship between circumference and diameter.
 - Relationship between area of a square and side length. *Area = units² ← Quadratic*
 - Relationship between diagonal of a square and side length.
 - Relationship between volume of a cube and side length.

6. If y is a quadratic function of x , which value completes the table?

- 12
- 20
- 44
- 48

x	-2	0	2	4	6
y	-8	0	12	28	

7. The graph of a quadratic function having the form $f(x) = ax^2 + bx + c$ passes through the points $(0, -8)$, $(3, 10)$, and $(6, 34)$. What is the value of the function when $x = -3$?

- 32
- 26
- 20
- 10

8. Which is the quadratic equation the best fits the scatterplot?

- $f(x) = (x - 3)^2 - 4$
- $f(x) = (x + 3)^2 + 4$
- $f(x) = (x - 4)^2 - 3$
- $f(x) = (x + 4)^2 + 3$

