

Exercises Sheet #1

Exercise 1

Consider the following data :

x	y
0.86	2.49
0.09	0.83
-0.85	-0.25
0.87	3.10
-0.44	0.87
-0.43	0.02
-1.10	-0.12
0.40	1.81
-0.96	-0.83
0.17	0.43

Questions :

- 1) Compute the parameter values W of the best line that fit these data ?
- 2) Compute the determination coefficient r^2 ?
- 3) How does the model fit the data?

Exercise 2

Recently, the annual number of driver deaths per 100,000 for the selected age groups was as follows:

Age	Number of Driver Deaths per 100,000
17.5	38
22	36
29.5	24
44.5	20
64.5	18
80	28

Based on the given data and using “ages” as the independent variable and “Number of driver deaths per 100,000” as the dependent variable :

- 1) Calculate the least squares (best-fit) line. Put the equation in the form of: $\hat{y} = a + bx$
- 2) What is the slope of the least squares (best-fit) line?
- 3) Find the determination coefficient r^2 .
- 4) Is there a linear relationship between age of a driver and driver fatality rate?
- 5) Predict the number of deaths for ages 40 and 60.

Exercise 3

The following table consists of one student athlete's time (in minutes) to swim 2000 yards and the student's heart rate (beats per minute) after swimming on a random sample of 10 days:

Swim Time	Heart Rate
34.12	144
35.72	152
34.72	124
34.05	140
34.13	152
35.73	146
36.17	128
35.57	136
35.37	144
35.57	148

- 1) Find the equation of the least-squares regression line.
- 2) How well does the regression line fit the data? Explain your response.
- 3) Which point has the largest residual (prediction error)? Explain what the residual means in context. Is this point an outlier? An influential point? Explain.

Exercise 4

The following example describes the expenditure (in dollars) on recreation per month by employees at a certain company, and their corresponding monthly incomes.

Expenditure (\$)	Income (\$)
2400	41200
2650	50100
2350	52000
4950	66000
3100	44500
2500	37700
5106	73500
3100	37500
2900	56700
1750	35600

- 1) Calculate the linear regression line for the data
- 2) What is the slope? What is the y-intercept?
- 3) What is the r value? What is the r^2 value?
- 4) Using the equation for the linear regression that you calculated, estimate the monthly income of an employee at this company who spends 5000 dollars per month on recreation.