Week 4

Week 4 Assignment For each correlation coefficient below, calculate what proportion of variance is shared by the two correlated variables: a. r = 0. 25

Coefficient of Determination, R2 = 0. 0625 (or 6. 25%)

b. r = 0. 33

R2 = 0. 1089 (or 10. 89%)

c. r = 0. 90

R2 = 0. 81 (or 81. 0%)

d. r = 0. 14

R2 = 0. 0196 (or 1. 96%)

2. For each coefficient of determination below, calculate the value of the correlation coefficient:

a. r2 = 0. 54

| r| = 0. 7348

b. r2 = 0. 13

| r| = 0. 3606

c. r2 = 0. 29

| r| = 0. 5385

d. r2 = 0. 07

| r| = 0. 2646

3. Suppose a researcher regressed surgical patients' length of stay (dependent variable) in the hospital on a scale of functional ability measured 24 hours after surgery. Given the following, solve for the value of the intercept constant and write out the full regression equation:

Mean length of stay = 6. 5days; mean score on scale = 33; slope = -0. 10

Intercept = 6. 5 – 33(-0. 10) = 6. 5 + 3. 3 = 9. 8

Regression equation: Length of Stay = 9. 8 – 0. 10(Scale)

4. Using the regression equation calculated in Exercise 3, compute the

predicted value of Y (length of hospital stay) for patients with the following

functional ability scores:

a. X = 42

Length of Stay = 9. 8 – 0. 10(42) = 9. 8 – 4. 2 = 5. 6

b. X = 68

Length of Stay = 9. 8 – 0. 10(68) = 9. 8 – 6. 8 = 3. 0

c. X = 23

Length of Stay = 9. 8 – 0. 10(23) = 9. 8 – 2. 3 = 7. 5

d. X = 10

Length of Stay = 9. 8 – 0. 10(10) = 9. 8 – 1. 0 = 8. 8

5. Use the regression equation below for predicting graduate GPA for the

three presented cases.

Y′ = -1. 636 + 0. 793(undergrad GPA) + 0. 004(GREverbal) – 0.

0009(GREquant)

+0. 009(Motivation)

Subjectundergrad GPAGREverbalGREquantMotivation

1 2. 9 560 540 55

2 3. 2 550 590 65

3 3. 4 600 550 70

Subject

undergrad GPA

GREverbal

GREquant

Motivation

Predicted Graduate GPA

1

2. 9

560

540

55

2. 91

2

3. 2

550

590

65

3. 16

3

3. 4

600

550

70

3. 60

6. Using the following information for R2, k, and N, calculate the value of the

F statistic for testing the overall regression equation and determine whether

F is statistically significant at the 0. 05 level:

a. R2 = 0. 13, k = 5, N = 120

b. R2 = 0. 53, k = 5, N = 30

c. R2 = 0. 28, k = 4, N = 64

d. R2 = 0. 14, k = 4, N = 64

(Assuming k represents number of independent variables in the regression)

dfR = k

dfE = N – 1 – k

F is statistically significant if F > FCrit or p-value ≤ . 05.

The answers are presented in below table.

R2

k

N

dfR

dfE

F

p-value

FCrit

Significant

a.

0. 13

5

120

5

114

3. 407

0. 007

2. 294

Yes

b.

0. 53

5

30

5

24

5. 413

0. 002

2. 621

Yes

c.

0. 28

4

64

4

59

5. 736

0. 001

2. 528

Yes

d.

0. 14

4

64

4

59

2. 401

0. 060

2. 528

No

7. According to the University of Chicago, as men age, their cholesterol level goes up. A new drug (XAB) is being tested to determine if it can lower cholesterol in aging males and at what dose. The data for the first test subject is below:

Dose (mg) 2 3 5 6 8 10

Cholesterol level (mg/dL) 3101242011105220

a. Plot the data and include a regression line in StatCrunch. Copy and paste your graph into your Word document for full credit.

b. What is the correlation coefficient r and what does it mean in this case?

The value of correlation coefficient r is -0. 8527. This suggests a very strong negative linear relationship between new drug (XAB) dose and cholesterol level in aging males.

c. What is the coefficient of determination and what does it mean in this case?

The value of coefficient of determination is 0. 7272. This indicates that new drug (XAB) dose explains about 72. 72% of the variations in cholesterol level in aging males.

d. Is there a statistically significant correlation between dose and cholesterol level in this case?

Yes, there is a statistically significant correlation between dose and

cholesterol level in this case (p-value = 0. 0309 < α = 0. 05).

e. What is the predicted cholesterol level for a person taking a dose of 4 mg?

What about if they are not taking the drug at all (0 mg)?

The predicted mean cholesterol level for a person taking a dose of 4 mg is

186. 04. If they are not taking the drug at all (0 mg), than it will be 305. 75.

StatCrunch Output

Simple linear regression results:

Dependent Variable: Cholesterol

Independent Variable: Dose

Cholesterol = 305. 75 - 29. 92647 Dose

Sample size: 6

R (correlation coefficient) = -0. 8527

R-sq = 0. 72717506

Estimate of error standard deviation: 61. 710186

Parameter estimates:

Analysis of variance table for regression model:

Predicted values: