

**Department of Computer Science**

**Bahria University**

**GSC-122: Probability & Statistics**

**Semester03 (Fall 2023)**

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**ASSIGNMENT 03**

Marks: 05

# NAME:

# CLASS: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

# REG #: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Marks Obtained:**

**CLO 3, PLO3 & BT level C3 (applicable to all questions of this assignment)**

1. (11.3) A study was made on the amount of converted sugar in a certain process at various temperatures. The data were coded and recorded as follows:

Temperature, *x* : 1.01.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0

Converted Sugar, *y:* 8.1 7.8 8.5 9.8 9.5 8.9 8.6 10.2 9.3 9.2 10.5

(a) Construct the linear regression line.

(b) Solve the mean amount of converted sugar produced when the coded temperature is 1.75.

2. (11.6) A mathematics placement test is given to all entering freshmen at a small college.

A student who receives a grade below 35 is denied admission to the regular mathematics course and placed in a remedial class. The placement test scores and the final grades for 20 students who took the regular course were recorded as follows:

Placement Test : 50 35 35 40 55 65 35 60 90 35 90 80 60 60 60 40 55 50 65 50

Course Grade : 53 41 61 56 68 36 11 70 79 59 54 91 48 71 71 47 53 68 57 79

(a) Apply scatter diagram plotting.

(b) Develop the equation of the regression line to predict course grades from placement test scores.

(c) Graph the line on the scatter diagram.

(d) Select 60 is the minimum passing grade, below which placement test score should students in the future be denied admission to this course?

3. (11.52) The following data were obtained in a study of the relationship between the

weight and chest size of infants at birth:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Weight (kg) | 2.75 | 2.15 | 4.41 | 5.52 | 3.21 | 4.32 | 2.31 | 4.30 | 3.71 |
| Chest Size (cm) | 29.5 | 26.3 | 32.2 | 36.5 | 27.2 | 27.7 | 28.3 | 30.3 | 28.7 |

Solve *r &*  Develop what percentage of the variation in the infant chest sizes is explained by difference in weight? Apply probable error and mentioned significance of correlation.

4. (11.5) The amounts of a chemical compound *y,* which dissolved in 100 grams of water at

various temperature, x were recorded as follows:

*x* (°C): 0 15 30 45 60 75 0 15 30 45 60 75 0 15 30 45 60 75

*y* (grams): 8 12 25 31 44 48 6 10 21 33 39 51 8 14 24 28 42 44

(a) Construct the equation of the regression line.

(b) Graph the line on a scatter diagram.

(c) Apply and estimate the amount of chemical that will dissolve in 100 grams of water at 50°C.

5. (5.5) Apply data provided by *Chemical Engineering/ Progress*(Nov. 1990), approximately 30% of

all pipework failures in chemical plants are caused by operator error.

(a) What is the probability that no more than 4 out of 20 such failures are due to operator error?

(b) Suppose, for a particular plant, that, out of the random sample of 20 such failures, exactly 5 are operational errors. Do you feel that the 30% figure stated above applies to this plant? Comment.

6. (5.7) One prominent physician claims that 70% of those with lung cancer are chain

smokers. If his assertion is correct, apply this information to find the probability that of 20 such patients recently admitted to a hospital, fewer than half are chain smokers.

7. (5.13) A study examined national attitudes about antidepressants. The study revealed that

approximately 70% believe antidepressants do not really cure anything, they just cover

up the real trouble." Apply this study, what is the probability that at least 3 of the next 5 people selected at random will be of this opinion?

8. (5.60) A certain area of the eastern United States is, on average, hit by 6 hurricanes a

year. Apply suitable method to find the probability that for a given year that area will be hit by

(a) fewer than 4 hurricanes;

(b) anywhere from 6 to 8 hurricanes.

9. (5.65) Suppose that, on average, 1 person in 1000 makes a numerical error in preparing

his or her income tax return. If 10,000 forms are selected at random and examined, Solve the probability that 6, 7, or 8 of the forms contain an error.

10. (6.11) A lawyer commutes daily from his suburban home to his midtown office. The average time for a

one-way trip is 24 minutes, with a standard deviation of 3.8 minutes. **Assume** the distribution of trip

times to be normally distributed.

(a) What is the probability that a trip will take at least 1/2 hour?

(b) If the office opens at 9:00 A.M. and he leaves his house at 8:45 A.M. daily, what percentage of the

time is he late for work?

(c) If he leaves the house at 8:35 A.M. and coffee is served at the office from 8:50 A.M. until 9:00 A.M.,

what is the probability that he misses coffee?

(d) Find the length of time above which we find the slowest 15% of the trips.

11. (6.13) The average life of a certain type of small motor is 10 years with a standard deviation of 2 years.

The manufacturer replaces free all motors that fail while under guarantee. If he is willing to replace only

3% of the motors that fail, how long a guarantee should he offer? **Assume** that the lifetime of a motor

follows a normal distribution.

**12.** (6.14) The heights of 1000 students are normally distributed with a mean of 174.5 centimeters and a

standard deviation of 6.9 centimeters. **Assume** that the heights are recorded to the nearest half-

centimeter, how many of these students would you expect to have heights

(a) less than 160.0 centimeters?

(b) between 171.5 and 182.0 centimeters inclusive?

(c) equal to 175.0 centimeters?

(d) greater than or equal to 188.0 centimeters?

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