Saurabh Srivastava

JAYPEE UNIVERSITY OF INFORMATRION TECHNOLOGY, WAKNAGHAT

TEST -1 EXAMINATION- February 2018

B.Tech. IV Semester

COURSE CODE: 10B12MA421 MAX. MARKS: 15

COURSE NAME: BIOSTATISTICS

COURSE CREDITS: 05 MAX. TIME: 1Hour

Note: *All questions are compulsory. Carrying of mobile phone during examinations will be treated as a case of unfair means.*

1. 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	:	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7
Converted Sugar, y	:	8.1	7.8	8.5	9.8	9.5	8.9	8.6	10.2

(a) Estimate the linear regression line.

(b) Construct a 95% confidence interval for the intercept (α). $t_{0.025,df=6} = 2.447$ **[3 MARKS]**

2. Compute the correlation coefficient for the following grades of 6 students selected at random:

Mathematics Grade:	70	92	80	74	65	83
Statistics Grade :	74	84	63	87	78	90

Test the hypothesis that $\rho = 0$ against the alternative that $\rho \neq 0$. Use a 0.05 level of significance.

$t_{0.05,df=4} = 2.132$ **[3 MARKS]**

3. An experiment was conducted to determine if the weight of an animal can be predicted after a given period of time on the basis of the initial weight of the animal and the amount of feed that was eaten . The following data were recorded;

$n = 0, \sum X_1 = 379, \sum X_2 = 2417, \sum X_1^2 = 14533, \sum X_1 X_2 = 92628, \sum X_2^2 = 601365,$

$\sum Y = 825, \sum X_1 Y = 31726, \sum X_2 Y = 204569$

Where, Final Weight : y, Initial Weight: x_1 and Feed Weight: x_2

(a) Write the multiple linear regression model in matrix form $Y = X\beta$

(b) If $(X'X)^{-1} = \begin{bmatrix} 8.6176 & -0.2178 & -0.0010 \\ -0.2178 & 0.0093 & -0.0005 \\ -0.0010 & -0.0005 & 0.0001 \end{bmatrix}$ *and* $X'Y = \begin{bmatrix} 825 \\ 31726 \\ 204569 \end{bmatrix}$, then find β_0, β_1 *and* β_2

[3 MARKS]

4. A food inspector examines 10 jars of a certain brand of jam to determine the percent of foreign impurities. The following data were recorded;

2.4 2.3 3.1 2.2 2.3 1.2 3.6 2.4 1.7 4.2

Perform a sign test at the 0.05 level of significance to test the null hypothesis that the median percent of impurities in this brand of jam is 2.5% against the alternative that the median percent of impurities is not 2.5%. Given that, $\sum_{x=0}^{3} b(x;10,0.5) = 0.3438$ **[3 MARKS]**

5. The following data represent the operating times in hours for three types of scientific pocket calculators before a recharge is required;

Calculator		
A	**B**	**C**
4.9	5.5	6.4
6.1	5.4	6.8
4.3	6.2	5.6
4.6	5.8	6.5
5.3	5.5	6.3
	5.2	6.6
	4.8	

Use the Kruskal-Wallis test at the 0.01 level of significance, to test the hypothesis that the operating times for all three calculators are equal. $\chi^2_{0.01,2} = 9.210$ **[3 MARKS]**