

ALLAMA IQBAL OPEN UNIVERSITY, ISLAMABAD
(Department of Mathematics and Statistics)

WARNING

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Course: Statistics-II (395)

Semester: Autumn, 2013

Level: Intermediate

Total Marks: 100

Passing Marks: 40

- Q. 1: a) Find the median, the lower and upper quartile and the inter-quartile range for a standard normal random variable Z .
- b) In a normal distribution $\mu = 40$ and $P(25 \leq X \leq 60) = 0.8662$, Find $P(20 \leq X \leq 60)$. (10+10)
- Q. 2: a) What does sampling mean? Describe the advantages of sampling over complete enumeration.
- b) A random sample of size 3 is to be randomly selected without replacement from a population 1, 3,5,7,9. Calculate mean and standard deviation of means from sampling distribution of mean. Also verify the properties of sampling distribution of mean. (10+10)
- Q. 3: a) Define Student's t -statistic. What assumptions are made about the population where the t -distribution is used?
- b) The means and variances of the weekly incomes in rupees of the workers employed in the different factories, from the samples are given below:
- | <u>Sample</u> | <u>Size</u> | <u>Mean</u> | <u>Variance</u> |
|------------------|-------------|-------------|-----------------|
| <i>Factory A</i> | 160 | 12.80 | 64 |
| <i>Factory B</i> | 220 | 11.25 | 49 |
- i. What is the maximum likelihood estimate of the difference in mean incomes?
- ii. Compute 95% confidence interval estimate for the real differences in the incomes of the workers from the two factories. (10+10)

- Q. 4: a) Describe the procedure for testing the equality of means of two normal populations for:
- i. Large samples,
 - ii. Small samples
- b) The time required by 10 persons to perform a task in seconds before and after receiving a mild stimulant are given in the accompanying table:

Before: 34 45 31 43 40 41 33 29 41 37

After: 29 42 32 29 36 42 26 28 38 33

Test the hypothesis that there is no difference between the mean times in the 'before' and 'after' population. As an alternative, assumed that the after population will have a lower mean. Use 5% level of significance. (10+10)

- Q. 5: a) Explain why the regression line of Y on X is not necessarily the same as the regression line of X on Y. How would you decide which is the approximate regression in any particular situation. Answer the following.
- i. When do the two lines coincide?
 - ii. When are they at right angles?
- b) The following are the measurements of height and weight of 8 men:

Height (inches) X:	78	89	97	69	59	79	68	67
Weight (pound) Y	125	137	156	112	107	136	123	104

Calculate the correlation coefficient by taking the deviations of variable X from 70 and of variable Y from 120. (10+10)

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Assignment No. 2

- Q. 1: a) What is meant by estimation? Differentiate between estimator and estimate.
- b) Explain what is meant by: (10+10)
- i. Statistical hypothesis
 - ii. Test statistic
 - iii. Significance level
 - iv. Test of significance
- Q. 2: a) What role does the sample mean play in a two sided confidence interval for μ , based on a random sample from $X \sim N(\mu, \sigma^2)$?
- b) A sample of 150 brands A light bulbs showed a mean lifetime of 1400 hours with a standard deviation of 120 hours. A sample of 200 brand B light bulbs showed a mean lifetime of 1200 hours with a standard deviation

of 80 hours. Find 99% confidence limits for the difference between the mean lifetime of the populations of brands A and B. (10+10)

- Q. 3: a) An examination was given to two classes of 40 and 50 students respectively. In the first class mean grade was 74 with standard deviation of 8, while in the second class the mean grade was 78 with a variance 49. Is there a significant difference between mean grades of two classes? Using 5% & 1% level of significance?
- b) A manufacturer claims that the average tensile strength of thread A exceeds the average tensile strength of thread B by at least 12 kilograms. To test his claims, 50 pieces of each type of thread are tested under similar condition. Type A thread had an average tensile strength of 86.7 kilograms with a standard deviation of 6.28 kilograms, while type B thread has an average tensile strength of 77.8 kilograms with a standard deviation of 5.61 kilograms. Test the manufacturer's claim using a 0.05 level of significance. (10+10)
- Q. 4: a) Define contingency table and cell frequency. What is a 2×2 contingency table?
- b) The following table gives the condition at home and condition of the children:

<u>Condition of Children</u>	<u>Condition at Home</u>	
	Clean	Not Clean
Clean	175	143
Fairly Clean	136	116
Dirty	125	145

Test for the association between the conditions at home and condition of children. (10+10)

- Q. 5: a) What is secondary storage? How it differ from a primary storage? Explain
- b) For the following time series, determine the trend by using the method of
- Semi average method,
 - 3 years moving average method

Years	1968	1969	1970	1971	1972	1973	1974	1975	1976
Value	2	4	6	8	7	6	8	10	12

Which of the trend do you prefer, and why? (10+10)