

KARACHI UNIVERSITY BUSINESS SCHOOL
University of Karachi
FINAL EXAMINATION, DECEMBER 2010: AFFILIATED COLLEGES
STATISTICAL INFERENCE: BA (H) – 432
BS – IV

Date: December 26, 2010

Max. Marks: 60

INSTRUCTION: Attempt all questions

Max. Time: 3 hrs.

1. The waiting time for takeoff in minutes for departing aircrafts at Chicago International Air port are assumed to be normally distributed with a mean of 25 minutes and a standard deviation of 12 minutes.
 - a) What is the probability that the plane you are boarding will take
 - i) At least 35 minutes
 - ii) At most 18 minutes
 - iii) Between 15 to 30 minutes.

[06]
 - b) What is the maximum waiting time of the 12 percent lowest waiting planes. [03]
 - c) What is the minimum waiting time of the 15 percent highest waiting planes. [03]

2. In every 25 street crimes only 4 culprits are apprehended by the law enforcing agencies in Karachi, whereas in every 25 street crimes 5 culprits are apprehended by the law enforcing agencies in Lahore. For a sample of 1000 crimes each in Karachi and Lahore
 - a) Test at 5% whether the apprehension rate (proportion) in Karachi falls short of that in Lahore. [06]
 - b) Construct 5% confidence interval for the difference in the proportion of apprehension at the two places. [06]

3. In a sample of 25 liter pouch of edible oil by Eva the quantity of oil found to be 1.04 k.g., on the average with a standard deviation of 0.12 k.g. In another sample of 16 pouch by Dalda, the quantity of oil found to be 0.96 k.g., on the average with a standard deviation of 0.09 k.g.,
 - a) Test at 2% whether the variances for the two brands are equal. [06]
 - b) As a consequence of the result obtain in a, above, test at 2% whether the average weight for the two brands differ significantly. [06]

Cont'd_____

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4. a) i) Explain the procedure of stratified random sampling, to what type of population it is generally applicable. [03]
ii) Distinguish between type-I and type-II errors, which one of these is relatively more severe and therefore needed to be minimized. [03]

b) A survey of 500 heart patients revealed the following information regarding smoking habit and the level of blood pressure. Test whether there exist any dependency between smoking habit and blood pressure at 1% level of significance. [06]

	<u>Non-Smoker</u>	<u>Moderate Smoker</u>	<u>Chain Smoker</u>
High B.P	35	65	130
Norm. B.P	45	80	83
Low B.P	25	15	22

5. The number of police officers (X) assigned to preventive petrol are believed to be associated to the number of serious crimes (Y). For a small town the past eight years data is given as under.

X:	12	13	15	17	20	21	26	28
Y:	162	154	138	130	127	121	114	112

- a) Obtain the regression equation of Y on X and predict the number of crimes when [06]
i) no officer is assigned to preventive petrol.
ii) 30 officers are assigned to preventive petrol.
b) Obtain the regression equation of X on Y and predict the number of officers required to eliminate crimes completely. [04]
c) Determine r^2 and interpret. [02]

G O O D L U C K

KARACHI UNIVERSITY BUSINESS SCHOOL
 University of Karachi
FINAL EXAMINATION, JUNE 2010: AFFILIATED COLLEGES
STATISTICAL INFERENCE: BA (H) – 432
BS – IV

Date: June 17, 2010

Max Time: 2.5 Hrs

Max Marks: 40

Question #3

[10]

The length of steel beams made by the Pakistan Steel is normally distributed with $\mu = 25.1$ feet and $\sigma = 0.25$ feet.

- What is the probability that a steel beam will be less than 24.8 feet long?
- What is the probability that a steel beam will be more than 25.25 feet long?
- What is the probability that a steel beam will be between 24.8 and 25.25 feet long?
- For a particular application, any beam less than 24.8 feet long must be scrapped. While testing 80 such beams how many would you expect to be scrapped?

Question #4

[5]

The height of college male students are known to be normally distributed with a mean of 67.39 inches and $\sigma = 1.3$ inches. A random sample of 400 students showed a mean height of 67.47 inches. Using a 0.05 significance level, test the hypothesis $H_0: \mu = 67.39$ against the $H_A: \mu > 67.39$. Comment on conclusion.

Question #5

[5]

In Karachi, a random sample of 400 viewers of different business channels showed that 275 like to watch Business Plus channel. Find an approximate 90% confidence interval on the true proportion of all the viewers living in Karachi who like to watch Business Plus.

Question #6

[10]

A psychologist examining art appreciation selected an abstract painting that had no obvious top or bottom. Hangers were placed on the painting so that it could be hung with any one of the four sides at the top. The painting was shown to a sample of $n = 50$ participants, and each was asked to hang the painting in whatever orientation looked best. The following data indicates how many times each of the four sides was placed at the top:

Top Up (Correct)	Bottom Up	Left Side Up	Right Side Up
18	17	7	8

The question for the hypothesis test is whether there are any preference among the four possible orientations. Are any of the orientations selected more or less often than would be expected simply by chance?

Question #7

[10]

The following table displays data on age and price for a sample of 11 Nissan cars.

- Determine the regression equation for the data.
- Graph the equation and the data points. (on your answer script)
- Describe the apparent relationship between age and price of cars.
- Use the regression equation to predict the price of a 3 year old car.
- Determine the coefficient of Determination. And Comment.

X	5	7	4	1	2.5	0.5	0	8
Y	6	4.5	7	9	6.5	6.75	12.5	3.5
	10	12	9					
	2	4.5	5.5					

KARACHI UNIVERSITY BUSINESS SCHOOL
UNIVERSITY OF KARACHI
FINAL EXAMINATION, JUNE 2009: AFFILIATED COLLEGES
STATISTICAL INFERENCE : BA (H) - 432

BS - IV



Time Allowed : 3 Hours
Date : June 13, 2009

Max. Marks : 60

Instruction: Attempt any five (5) questions. All questions carry equal marks.

Pg # 197

- Q1 a) Define Normal distribution and describe its properties.
- b) Given a normal distribution with $\mu=40$ and $\sigma=6$, find the probability and shade the area
 - i) below 32
 - ii) above 27
 - iii) between 42 and 51

Pg # 311

- Q2 a) Explain any three of the following terms:
 - i) Null and alternative Hypotheses
 - ii) Simple and Composite Hypotheses
 - iii) Statistic and Parameter
 - iv) One tailed and two tailed test
- b) The manager of a Pizza Hut claims that it can deliver pizza to any location in the city within 30 minutes of receiving telephone order. A sample of 28 such deliveries yield an average delivery time of 34.5 minutes with $s=2.3$ minutes. What can be said about the manager's claim at 5% level of significance?

confidence Interval

- Q3 a) Distinguish between simple and stratified random sampling schemes. Give at least two practical examples where the two sampling schemes are used.
- b) The financial manager of a large department-store chain selected a random sample of 200 of its credit card customers and found that 136 had incurred an interest charge during the previous year because of an unpaid balance. Compute a 90% confidence interval for the true proportion of credit card customers who incurred an interest charge during the previous year.

Q4

A manufacturer suspects a difference in the equality of spare parts he receives from two suppliers. He obtains the following data on the service list of parts from two suppliers.

Supplier	Mean	Sample size	S.D.
A	50	150	10
B	100	153	5

Test whether the difference between two sample means is statistically significant at 0.01 L.O.S and construct a confidence interval for the true difference of the two means.

Q5

Fuel costs are important to profitability in the airline business. A small regional carrier has been operating three types of aircraft and has collected the following cost data from its 14 planes, expressed as fuel costs (in ten rupees) per available seat mile:

Type A	7.3	8.3	7.6	6.8	8.0	
Type B	7.9	9.5	8.7	8.3	9.6	8.4

difference

- a) At the 0.01 level of significance, can we conclude that there is no true difference between plane types in fuel costs?
- b) Construct a 95% confidence interval for the true difference of the two means.

Pg # 341

- Q6 a) Describe the three uses of Chi square Test.
- b) In an experiment to study the dependence of hypertension on smoking habits, the following data were taken on 180 individuals:

	Non-smokers	Moderate smokers	Heavy smokers
Hypertension	21	36	30
No hypertension	48	26	19

Test the hypothesis that the presence or absence of hypertension is independent of smoking habits. Use a 0.05 level of significance.

Please Turn Over

(2)

Q7 A book publisher has produced seven comparable text-books with the following costs:

Quantity produced (000):	1	2	4	5	7	9	13
Manufacturing costs (£000):	5	5.9	6.5	7.5	8	9.5	10.8

- a) Calculate the correlation coefficient for the association between quantity produced and manufacturing costs. Test it for significance at 5%.
 - b) Plot the data on a scatter diagram.
 - c) Calculate the regression line for predicting manufacturing costs from quantity produced, interpret its coefficients and add it to the scatter diagram
 - d) Estimate how much of the variation in costs is accounted for by the model.
 - e) Predict the manufacturing costs of an eighth text-book which has an expected production run of 12,000 copies.
- Q8 Define a Time Series and discuss its main components with the help of diagrams. Explain in detail one method to find trend in a given time series.

KARACHI UNIVERSITY BUSINESS SCHOOL
UNIVERSITY OF KARACHI
FINAL EXAMINATION, DECEMBER 2008: AFFILIATED COLLEGES
STATISTICAL INFERENCE: BA (H) - 432
BS - IV

Date: December 30, 2008
 Time allowed: 3 Hours

Max Marks: 60

✓ Q.1(a) The diameter of lids for tin cans produced by a certain manufacturer are normally distributed with a mean of 4 inches and a standard deviation of 0.012 inches. What proportion of the lids produced are between 3.97 inches and 4.03 inches?

✓ (b) Marks obtained by the students in an examination follow a normal distribution with mean of 72 marks and standard deviation of 9 marks. If top 10% of the students are to receive grade A, what minimum marks a student must get in order to receive grade A?

Q.2(a) Differentiate between:

(i) Parameter and Statistic. (ii) Simple Random and Stratified Random Sampling.

(b) Draw all possible samples of size 2 without replacement from the population 2, 4, 6, 10, 14. Verify that sample mean is an unbiased estimator of population mean.

Q.3(a) Define: (i) Unbiased estimator. (ii) Consistent estimator.

confidence interval
 (b) Nine bearings made by a certain process have a mean diameter of 0.505 cms and a standard deviation of 0.004 cms. Construct a 99% confidence interval for the mean diameter of bearings made by this process.

✓ Q.4(a) An employment exchange officer claims that the applications received in his office are processed in an average of less than 5 working days. A sample of 8 applications are randomly taken, and these were processed in 7, 6, 7, 9, 3, 3, 8, and 5 days. Assuming that the processing time is normally distributed, test the validity of the officer's claim at 0.01 level of significance.

Hypothesis
 ✓ (b) If 8 short - range rockets of one kind have a mean target error of $\bar{x}_1 = 98$ feet with a standard deviation of $s_1 = 18$ feet while 10 short - range rockets of another kind have mean target error of $\bar{x}_2 = 76$ feet with a standard deviation of $s_2 = 15$ feet, test the null hypothesis $\mu_1 - \mu_2 = 15$ against the alternative hypothesis $\mu_1 - \mu_2 > 15$. Assume populations as normal with equal variances. Use $\alpha = 0.05$.

goodness of fit test
 Q.5(a) A market researcher believes that in a certain population the proportion of persons preferring brands A, B, C and D of tooth paste are 0.30, 0.60, 0.08 and 0.02 respectively. A simple random sample of 600 persons drawn from the population shows the following preferences.

Brand	A	B	C	D
Number of person	192	342	44	22

Do these data provide sufficient evidence to reject the research's belief at $\alpha = 0.01$

(2)

(b) The following table shows the number of good and defective parts produced per hour on each of three shifts at a manufacturing plant.

Using the 0.05 level of significance, test the hypothesis that there is no significant difference between the proportion of defective parts produced on the three shifts.

Hypothesis

Parts	First Shift	Second Shift	Third Shift
Good	49	47	40
Defective	14	10	5

Q.6(a) The data in the following table give the market – share of a product for a given advertising expenditure.

(i) Find the least squares line of regression to estimate market – share for a given advertising expenditure.

(ii) Estimate market – share when advertising expenditure is Rs.300,000.

Regression

Month	Market shares (%)	advertising expenditure (Rs.0000)
Jan.	15	23
Feb.	17	25
Mar.	13	21
Apr.	14	24
May.	16	26

(b) The two lines of regression for a sample of 8 pairs of values were determined as:

$$\hat{y} = -1425 + 1.42x$$

$$\hat{x} = 68.58 + 0.12y$$

(i) Calculate coefficient of correlation r.

(ii) What proportion of variation in y is reduced by the regression line of y on x?

(a) Define a Time Series and its Components. What are the methods to measure secular trend?

(b) The following data show average hourly earnings of workers of a corporation.

Years	Earnings
1970	1.83
1971	2.05
1972	2.26
1973	2.39
1974	2.49
1975	2.70
1976	2.93
1977	3.19
1978	3.50

Time Series

Find the equation of the trend line by the method of least squares and draw that line.

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