ALLAMA IQBAL OPEN UNIVERSITY, ISLAMABAD

(Department of Mathematics & Statistics)

ASSIGNMENT No. 1

Course: Statistics for Management (1430) **Semester: Autumn-2013**
Level: Graduation **Total Marks: 100**
  Pass Marks: 40

Q. 1. a) What do you know about frequency distribution and its importance. How do we construct it? (5)

  b) For the purpose of performance evaluation and quota adjustment, Mr. Hanif monitored the auto sales of his 40 salespeople. Over a 1-month period, he sold the following number of cars: (15)

7	8	5	10	9	10	5	13	8	6
10	11	6	5	10	11	10	5	9	13
8	12	8	8	10	15	7	6	8	8
5	6	9	7	14	8	7	5	5	14

  (i) Based on frequency, what would be the desired class marks (midpoints of the intervals)?

  (ii) Construct a frequency and relative frequency distribution having as many of these marks as possible. Make your intervals evenly spaced and at least two cars wide.

  (iii) If sales fewer than seven cars a month is considered unacceptable performance, which of the two answers, (a) or (b), helps you more in identifying the unsatisfactory group of salespeople?

Q. 2. a) What are frequency Polygon & Ogives. How do we draw these? (10)

  b) For the following frequency distribution, determine (10)
  a)The median class.

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b) The width of the equal steps in the median class.

c) The estimated value of the median for these data.

Class	Frequency	Class	Frequency
100 – 149.5	12	300 – 349.5	72
150 – 199.5	14	350 – 399.5	63
200 – 249.5	27	400 – 449.5	36
250 – 299.5	58	450 – 499.5	18

Q. 3.   a)   State life Insurance provides information to its subscribers to enable them to evaluate the performance of mutual funds they are considering as potential investment vehicles. A recent survey of funds whose stated investment goal was growth and income produced the following data on total annual rate of return over the past five years: (10)

Annual return (%)	11.0 – 11.9	12.0 – 12.9	13.0 – 13.9	14.0 – 14.9	15.0 – 15.9	16.0 – 16.9	17.0 – 17.9	18.0 – 18.9
Frequency	2	2	8	10	11	8	3	1

   i.   Calculate the mean, variance, and standard deviation of the annual rate of return for this sample of 45 funds.

   ii.   According to Chebyshev's theorem, between what values should at least 75 percent of the sample observations fall? What percentage of the observations actually does fall in that interval?

   iii.   Because the distribution is roughly bell-shaped, between what values would you expect to find 68 percent of observations? What percentage of the observations actually do fall in that interval?

   b)   Students' ages in the regular daytime M.B.A. program and the evening program of AIOU are described by these two samples: (10)

Regular M.B.A	23	29	27	22	24	21	25	26	27	24
Evening M.B.A	27	34	30	29	28	30	34	35	28	29

   If homogeneity of the class is a positive factor in learning, use a measure of relative variability to suggest which of the two groups will be easier to teach.

Q. 4.   a)   An engineer tested nine samples of each of three designs of a certain bearing for a new electrical winch. The following data are the number of hours it took for each bearing to fail when the winch motor was run continuously at maximum output, with a load on the winch equivalent to 1.9 times the intended capacity.   (10)

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Design		
A	B	C
16	18	31
16	27	16
53	23	42
15	21	20
31	22	18
17	26	17
14	39	16
30	17	15
20	28	19

    i.   Calculate the mean and median for each group.

    ii.   Based on your answer, which design is best and why?

b)   Irfan Ahmad does statistical analyses for an automobile racing team. Here are the fuel consumption figures in miles per gallon for the team's cars in recent races: (10)

| 4.77 | 6.11 | 6.11 | 5.05 | 5.99 | 4.91 | 527 | 6.01 |
| 5.75 | 4.89 | 6.05 | 5.22 | 6.02 | 5.23 | 6.11 | 5.02 |

    i.   Calculate the mean and median fuel consumption.

    ii.   Group the data into five equally sized classes. What is the fuel consumption value of the modal class?

    iii.   Which of the three measures of central tendency is best for Irfan to use when he orders fuel? Explain.

Q. 5.   a)   How would you reply to the following statement: "Variability is not an important factor because even though the outcome is more uncertain, you still have an equal chance of falling either above or below the median. Therefore, on average, the outcome will be the same."   (10)

b)   Sarsabz Seed Company sells three grades of Early White Sugar corn seed, distinguished according to the consistency of germination of the seeds. The state seed testing laboratory has a sample of each grade of seed and its test results on the number of seeds that germinated out packages of 100 are as follows.   (10)

Grade I (Regular)	88	91	92	89	79
Grade II (Extra)	87	92	88	90	92
Grade III (Super)	90	89	79	93	88

Does Company's grading of its seed make sense?

ASSIGNMENT No. 2

Q. 1. a) Write down the general procedure for testing of hypothesis. Explain each & every step. (10)

   b) A grocery store has specially packaged oranges and has claimed a bag of oranges will yield 2.5 quarts of juice. After randomly selecting 42 bags, a stocker found the average juice production per bag to be 2.2 quarts. Historically, we know the population standard deviation is 0.2 quart. Using this sample and a decision criterion of 2.5 standard errors, could we conclude the store's claims are correct? (10)

Q. 2. a) Under what condition is it appropriate to use a one-tailed test? A two-tailed test? (5)

   b) Your null hypothesis is that the battery for a heart pacemaker has an average life of 300 days, with the alternative hypothesis being that the battery life is more than 300 days, you are the quality control engineer for the battery manufacturer. (5)

   c) What is the relationship between the significance level of a test and type I error? (5)

Q. 3. a) Intel, a manufacturer of chips for computers, is in the process of deciding whether to replace its current semiautomated assembly line with a fully automated assembly line. Intel has gathered some preliminary test data about hourly production, which is summarized in the following table, and it would like to know whether it should upgrade its assembly line. State (and test at $\alpha = 0.02$) appropriate hypotheses to help Intel decide. (5)

	$\bar{x}$	s	n
Semiautomatic line	198	32	150
Automatic line	206	29	200

   b) Service tires currently produce tires at their Karachi plant during two 12-hurs shifts. The night-shift employees are planning to ask for a raise because they believe they are producing more tires per shift than the day shift. "Because Service is making more money during the night shift, those employee should also make more money" according to the night-shift spokesman. Javaid Aslam, the Service production super-visor, randomly selected some daily production runs from each shift with the results given below (in 1,000s of tires produced) (10)

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Shift	Production (in 1,000s)								
Day	107.5	118.6	124.6	1016	113.6	119.6	120.6	109.6	105.9
Night	115.6	109.4	121.6	128.7	136.6	125.6	121.3	180.6	117.5

Do these data indicate, at $\alpha = 0.01$, that the night shift is producing more tires per shift?

c) A group of clinical physicians is performing tests on patients to determine the effectiveness of a new antihypertensive drug. Patients with high blood pressure were randomly chosen and then randomly assigned to either the treatment groups (which received a well-established antihypertensive) ore percentage of patients whose blood pressure as reduced to a normal level with 1 year. At the 0.01 level significance, test appropriate hypotheses older drug in reducing high blood pressure. (5)

Groups	Proportion That Improved	Number of Patients
Treatment	0.45	120
Control	0.36	150

Q. 4. a) Sales of major appliances vary with the new housing marked: when new home sales are good, so are the sales of dishwashers, washing machines, drier, and refrigerators. A trade association compiled the following historical data (in thousands of units) on major appliance sales and housing starts: (10)

Housing Starts (thousands)	Appliance Sales (thousands)
2.0	5.0
2.5	5.5
3.2	6.0
3.6	7.0
3.3	7.2
4.0	7.7
1.2	8.4
4.6	9.0
4.8	9.7
5.0	10.0

  i. Develop an equation for the relationship between appliance sales (in thousands) and housing starts (in thousands).
  ii. Interpret the slope of the regression line.
  iii. Compute and interpret the standard error of estimate.

b) Bank of Punjab is interested in reducing the amount of time people spend waiting to see a personal banker. The bank is interested in the relationship

between waiting time (Y) in minutes and number of bankers on duty (X). Customers were randomly selected with the data given below: (10)

X	2	3	5	4	2	6	1	3	4	3	3	2	4
Y	11.8	11.3	3.2	6.4	11.	3.2	8.7	10.5	8.2	11.3	9.4	12.8	8.2

Q. 5. a) Mr. Ajmal owns the corner fruit stand in a small town. After hearing many complaints that his prices constantly changes during the summer, he has decided to see whether this is true. Based on the following data, help Mr. Ajmal calculate the appropriate weighted aggregate price indices for each month. Use June as the base period. Is your result a Laspeyres index or a Paasche index? (10)

Fruit	Price per Pound			No. of Pounds Sold
	June	July	Aug.	June
Apples	$0.59	$0.64	$2.00	900
Oranges	0.75	0.65	0.70	200
Peaches	0.87	0.90	0.85	125
Watermelons	1.00	1.10	0.95	350
Cantaloupes	0.95	0.89	0.90	150

b) In preparation for an appropriation hearing, the police commissioner of a Gujranwala has collected the following information:

Type of Crime	1992	1993	1994	1995
Assault and rape	110	128	134	129
Murder	30	45	40	48
Robbery	640	720	770	830
Larceny	2,450	2,630	2,910	2,890

Calculate the unweighted average of relative quantity index for each of these years using 1995 as the base period. (10)