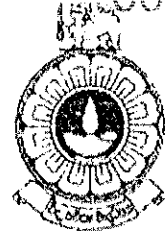


THE OPEN UNIVERSITY OF SRI LANKA
DEPARTMENT OF TEXTILE AND APPAREL TECHNOLOGY
BACHELOR OF SOFTWARE ENGINEERING HONOURS
TTZ4161 – PROBABILITY AND STATISTICS
FINAL EXAMINATION – 2016/2017
DURATION – THREE HOURS



DATE: 16th November 2017

TIME: 0930- 1230hrs

Answer Question 01, which is compulsory and additional five (05) questions.

Question 1 carries twenty-five marks and Questions 2 to 8 carry fifteen (15) marks each.

You should clearly show the steps involved in solving problems.

No marks will be awarded for mere answers without writing the necessary steps.

01. Compulsory Question

A. Briefly describe the following terms that are used in statistics.

- i. Sample and Population
- ii. Inferential Statistics
- iii. Interval Estimation

(09 Marks)

B. Ten students were given a mathematics test and the times (in minutes) to complete the test are given below.

10, 9, 12, 11, 8, 15, 9, 7, 8, 6

- i Calculate the mean and median of the sample group
- ii Calculate the standard deviation of the sample

(06 Marks)

C. In a Poisson distribution of $\mu = 0.1$

- What is the probability at $x=0$?

(02 Marks)

D Determine the area under the Standard Normal curve for the following situations.

- Area to the right of $Z=1.23$
- Area between $Z = - 1.64$ and 1.42 (04 Marks)

E. On a final examination in TTZ4241, the mean was 60 and Standard Deviation was 10. What is the Z-value for marks 70? (02 Marks)

F. Briefly describe what you understands by a " Null Hypothesis" and "Alternate Hypothesis" in hypothesis test. (02 Marks)

Answer any five questions from Question Nos. 02 to 08

(02) (a) Give two (02) reasons as to why measures of dispersion in a given set of data is important. (02 Marks)

(b) The following are the marks obtained by the students following the course Statistics.

83	64	84	76	84	54	75	59	70	61
63	80	84	73	68	52	65	90	52	77
95	46	78	61	59	84	45	47	87	60

- i. Arrange the marks in a frequency table. (03 Marks)
- ii Calculate mean, and median of the data. (04 Marks)
- iii Calculate the variance, standard deviation and coefficient of variation (06 Marks)

(03) (a) Define the "Probability " of an event. (03 Marks)

(b) A bag contains 100 marbles. Twenty (20) of them are red, 30 are black, 15 are blue and 35 are yellow. Two marbles are drawn one at a time from the bag **without replacements**. What is the probability that,

- (i) the second marble is black given that first is a yellow one (04 Marks)
- (ii) both the marbles are red. (04 Marks)

- (c) A sales representative makes calls to 3 separate unrelated customers. The chance of making a sale at any one of them is 40%. What is the probability that a sale is made on third call ? (04 Marks)

- (04) (a) Write three (03) characteristics of the binomial probability distribution. (03 Marks)

- (b) As per the records of the HR Department of ABC company, 10% of the employees of the company are absent every day. Ten (10) employees are to be selected at random for a study.

- (i) What is the random variable in this situation?
 (ii) What is the probability that none of them is absent?
 (iii) What is the probability that more than eight (08) employees have absent from work? (12 Marks)

- (05) (a) Confidence interval for a large populations can be written as

$$\mu = \bar{X} \pm Z_{\alpha/2} \sigma / \sqrt{n}$$

Where \bar{X} = sample mean

σ = population standard deviation

n = sample size

Determine the values of $Z_{\alpha/2}$ for 90%, 95%, and 99% confidence

intervals for μ . (06 Marks)

- (b) A teacher counted the number of misspelled words in a report he recently assigned to a sample of 40 students. The mean number of misspelled words was 5.2 and the standard deviation 1.8. Calculate mean number of misspelled words in the population of students under the 99%, 95%, and 92% confidence limits. (09 Marks)

(06)(a) Explain, what do you understand by "Sampling distribution of means"

(03 Marks)

(b) A population consists of following four values:

12, 12, 14, 16

(i) How many samples of 2 are possible? (02 Marks)

(ii) List all possible samples of size 2 and compute the mean of each sample. (03 Marks)

(iii) Compute the mean of the sample means and the population mean.

Comment on the results. (03 Marks)

(c) State the "Central Limit Theorem" and describe its importance in statistics.

(04 Marks)

(07)(a) Describe what do you understand by "Hypothesis Testing"? (02 Marks)

(b) The production rate of ABC Company has been normally distributed over a period of time. The mean production rate is 100 pieces per day and standard deviation is 9. Recently the board of management introduced new production methods to improve the production rate. Management wants to test whether the production rate is increased or not.

In order to test the hypothesis, the production rates during 100 production shifts are analyzed. It was found that mean production rate is 104.

Take the level of significance is 0.01

(i) State the "Null Hypothesis" and the "Alternate Hypothesis" (04 Marks)

(ii) What is the decision rule? (02 Marks)

(iii) Compute the test statistics. (04 Marks)

(iv) Can they conclude that the production rate is increased at the

0.01 level significant level? (03 Marks)

(08) (a) Discuss the importance of the standard normal probability distribution.

(02 Marks)

(b) An executive at ABC company drives from his home to his office in Colombo. The driving times are normally distributed with a mean of 40 minutes and a standard deviation of 10 minutes.

(i) What is the percentage of days will it take him 30 minutes or less to drive to work? (04 Marks)

(ii) What is the percentage of days will it take him 50 minutes or more to drive to work? (04 Marks)

(iii) What is the percentage of days will it take him 40 minutes to 50 minutes drive to work. (05 Marks)

Appendix -

Normal Distribution Table

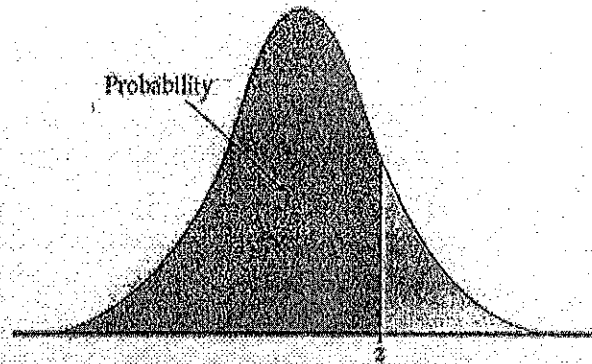


Table entry for z is the area under the standard normal curve to the left of z .

Standard normal probabilities										
z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.5000	.5040	.5080	.5120	.5160	.5199	.5239	.5279	.5319	.5359
0.1	.5398	.5438	.5478	.5517	.5557	.5596	.5636	.5675	.5714	.5753
0.2	.5793	.5832	.5871	.5910	.5948	.5987	.6026	.6064	.6103	.6141
0.3	.6179	.6217	.6255	.6293	.6331	.6368	.6406	.6443	.6480	.6517
0.4	.6554	.6591	.6628	.6664	.6700	.6736	.6772	.6808	.6844	.6879
0.5	.6915	.6950	.6985	.7019	.7054	.7088	.7123	.7157	.7190	.7224
0.6	.7257	.7291	.7324	.7357	.7389	.7422	.7454	.7486	.7517	.7549
0.7	.7580	.7611	.7642	.7673	.7704	.7734	.7764	.7794	.7823	.7852
0.8	.7881	.7910	.7939	.7967	.7995	.8023	.8051	.8078	.8106	.8133
0.9	.8159	.8186	.8212	.8238	.8264	.8289	.8315	.8340	.8365	.8389
1.0	.8413	.8438	.8461	.8485	.8508	.8531	.8554	.8577	.8599	.8621
1.1	.8643	.8665	.8686	.8708	.8729	.8749	.8770	.8790	.8810	.8830
1.2	.8849	.8869	.8888	.8907	.8925	.8944	.8962	.8980	.8997	.9015
1.3	.9032	.9049	.9066	.9082	.9099	.9115	.9131	.9147	.9162	.9177
1.4	.9192	.9207	.9222	.9236	.9251	.9265	.9279	.9292	.9306	.9319
1.5	.9332	.9345	.9357	.9370	.9382	.9394	.9406	.9418	.9429	.9441
1.6	.9452	.9463	.9474	.9484	.9495	.9505	.9515	.9525	.9535	.9545
1.7	.9554	.9564	.9572	.9582	.9591	.9599	.9608	.9616	.9625	.9633
1.8	.9641	.9649	.9656	.9664	.9671	.9678	.9686	.9693	.9699	.9706
1.9	.9713	.9719	.9726	.9732	.9738	.9744	.9750	.9756	.9761	.9767
2.0	.9772	.9778	.9783	.9788	.9793	.9798	.9803	.9808	.9812	.9817
2.1	.9821	.9826	.9830	.9834	.9838	.9842	.9846	.9850	.9854	.9857
2.2	.9861	.9864	.9868	.9871	.9875	.9878	.9881	.9884	.9887	.9890
2.3	.9893	.9896	.9898	.9901	.9904	.9906	.9909	.9911	.9913	.9916
2.4	.9918	.9920	.9922	.9925	.9927	.9929	.9931	.9932	.9934	.9936
2.5	.9938	.9940	.9941	.9943	.9945	.9946	.9948	.9949	.9951	.9952
2.6	.9953	.9955	.9956	.9957	.9959	.9960	.9961	.9962	.9963	.9964
2.7	.9965	.9966	.9967	.9968	.9969	.9970	.9971	.9972	.9973	.9974
2.8	.9974	.9975	.9976	.9977	.9977	.9978	.9979	.9979	.9980	.9981
2.9	.9981	.9982	.9982	.9983	.9984	.9984	.9985	.9985	.9986	.9986
3.0	.9987	.9987	.9987	.9988	.9988	.9989	.9989	.9989	.9990	.9990
3.1	.9990	.9991	.9991	.9991	.9992	.9992	.9992	.9992	.9993	.9993
3.2	.9993	.9993	.9994	.9994	.9994	.9994	.9994	.9995	.9995	.9995
3.3	.9995	.9995	.9995	.9996	.9996	.9996	.9996	.9996	.9996	.9997
3.4	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9998

