

The Open University of Sri Lanka
Faculty of Engineering Technology
Department of Textile and Apparel Technology



Study Programme	: Bachelor of Software Engineering Honours
Name of the Examination	: Final Examination
Course Code and Title	: TAZ4261/TTZ4161-Probability and Statistics
Academic Year	: 2019/20
Date	: 25 th September 2020
Time	: 0930-1230hrs

General Instructions

1. Read all instructions carefully before answering the questions.
2. This question paper consists of **Eight (8)** questions in Six **(6)** pages.
3. **Answer Question 01, which is compulsory** and additional **Five (5)** questions only.
Question 01 carries 25 marks and questions 2 to 8 carries fifteen (15) marks each.
4. Answer for each question should commence from a new page.
5. Answers should be in clear hand writing.
6. **You should clearly show the steps involved in solving problems**
7. **No marks are awarded for the mere answers without writing the necessary steps**

(01) Compulsory Question

(A) Briefly describe the following terms used in statistics.

- (i) Sample and Population
- (ii) Inferential Statistics.
- (iii) One tailed test and Two tailed test

(06 Marks)

(B) ABC Institute has 12 applicants for a selection test. Following are the scores obtained by the applicants.

60 62 76 59 84 82 83 73 52 70 71 75

(i) Calculate the mean and the median of the marks. (02 Marks)

(ii) Calculate the standard deviation of the marks.

(Show your calculation method clearly) (04 Marks)

(C) A bag contains 40 black balls, 30 green balls and 20 yellow balls.

Two balls are to be selected one after the other without replacement.

(i) What is the probability of getting two black balls?

(ii) What is the probability of getting a green ball followed by yellow ball?

(04 Marks)

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

- Area to the right of $Z=1.00$
- Area between $Z= - 1.0$ and 1.34

(02 Marks)

(E) In a standard test the mean mark was 60 and standard deviation is 15. Calculate the Z-value for the mark 70.

(03 Marks)

(F) Briefly explain what you understand by "Null hypothesis" and "Alternate hypothesis".

(04 Marks)

Answer any Five (05) questions from the below Seven (07) questions.

(02) (a) In a given set of data, two measures are important.

(i) measures of central tendency.

(ii) measures of dispersion

Explain the importance of each of them

(02 Marks)

(b) Following are the marks obtained by a group of students in an assessment test.

31	73	75	51	64
42	62	52	65	32
34	38	72	74	66
67	68	69	78	53
44	56	45	57	58
68	55	56	57	63

(i) Arrange them in a frequency table.

(04 Marks)

(ii) Calculate mean, and median of the data.

(04 Marks)

(iii) Calculate the standard deviation and coefficient of variation (CV%) of the set of data.

(05 Marks)

(03) (a) Write the general rule of multiplication and general rule of addition in probability.
(03 Marks)

(b) A survey of senior citizens reveals that 40 percent of them regularly read "Sunday Times", 25 percent read "Observer" and 40 percent read "The Nation" newspapers. Also 10 percent read both "Sunday Times" and "The Nation" newspapers..

(i) What is the probability that a particular citizen reads either "Sunday Times" or "The Nation" news papers ?
(05 Marks)

(ii) Are the events mutually exclusive? Explain the answer
(03 Marks)

(c) There are 1000 garments in a box and 40 of which are defective. Three garments are to be selected, one after the other.

What is the probability that

(i) All three will be defective ?

(02 Marks)

(ii) The first one is defective and the other two are non-defective ? (02 Marks)

(04)(a) Write three (03) characteristics of the "Binomial probability distribution".

(03 Marks)

(b) In a recent study, it was found that 60% of the students follow TAZ4261, has got the eligible to sit the final examination. Ten (10) students were selected for a study.

- (i) What is the random variable in this problem?
- (ii) Is the random variable discrete or continuous?
- (iii) What is the probability that all 10 students are **not** eligible.?
- (iv) What is the probability that more than eight (08) students have **Not** eligible?

(12 Marks)

(05) (a) Write two applications of "Poisson probability distribution".

(03 Marks)

(b) A study of the customer care unit of the ABC Bank revealed that, during a certain period at the rush hours the number of customers waiting is averaged **three (03)**. The distribution of the number of customers waiting approximated Poisson Distribution.

What is the probability that during that period,

- (i) No customers were waiting?
- (ii) Three customers were waiting?
- (iii) Three or fewer were waiting?
- (iv) More than three were waiting?

(12 Marks)

(06)(a) The lengths of service of the five executives employed in ABC Apparel company is as follows.

20, 22, 26, 24, 28

(i) How many samples of 2 are possible? (01 Marks)

(ii). List all possible samples of size 2, and compute the mean of each sample. (05 Marks)

(iii). Compute the mean of the sample means and the population mean. Comment on your answer. (05 Marks)

(b) State the "Central Limit Theorem" and describe its importance in statistics. (04 Marks)

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

(b) In a hypothesis testing, The null hypothesis and alternate hypothesis are as follows

$$H_0: \mu = 60$$

$$H_1: \mu \neq 60$$

The sample of size 36 is taken and the sample mean is 59 and standard deviation is 5. significance level is taken as 0.05

(i) Is this a one-tailed or a two-tailed test? (02 Marks)

(ii) Compute the value of the test statistics (04 Marks)

(iii) State the decision rule (04 Marks)

(iv) What is your decision regarding H_0 ? (03 Marks)

(08) (a) Briefly describe what you understand by "Z-scores" used in statistics.
(03 Marks)

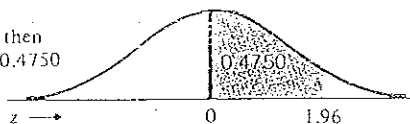
(b) The number of sick leave requested annually by employees of the ABC Company is normally distributed with 12 days and standard deviation 3 days. There are 1000 employees in the company.

- (i) What percentage of the employees request at least 12 days sick leave?
- (ii) How many employees request at least 13 days sick leave?
- (iii) How many employees request sick leave between 9 days to 13 days annually?

(12 Marks)

AREAS UNDER THE NORMAL CURVE

Example:
If $z = 1.96$, then
 $P(0 \text{ to } z) = 0.4750$



Z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.0000	0.0040	0.0080	0.0120	0.0160	0.0199	0.0239	0.0279	0.0319	0.0359
0.1	0.0398	0.0438	0.0478	0.0517	0.0557	0.0596	0.0636	0.0675	0.0714	0.0753
0.2	0.0793	0.0832	0.0871	0.0910	0.0948	0.0987	0.1026	0.1064	0.1103	0.1141
0.3	0.1179	0.1217	0.1255	0.1293	0.1331	0.1368	0.1406	0.1443	0.1480	0.1517
0.4	0.1554	0.1591	0.1628	0.1664	0.1700	0.1736	0.1772	0.1808	0.1844	0.1879
0.5	0.1915	0.1950	0.1985	0.2019	0.2054	0.2088	0.2123	0.2157	0.2190	0.2224
0.6	0.2257	0.2291	0.2324	0.2357	0.2389	0.2422	0.2454	0.2486	0.2517	0.2549
0.7	0.2580	0.2611	0.2642	0.2673	0.2704	0.2734	0.2764	0.2794	0.2823	0.2852
0.8	0.2881	0.2910	0.2939	0.2967	0.2995	0.3023	0.3051	0.3078	0.3106	0.3133
0.9	0.3159	0.3186	0.3212	0.3238	0.3264	0.3289	0.3315	0.3340	0.3365	0.3389
1.0	0.3413	0.3438	0.3461	0.3485	0.3508	0.3531	0.3554	0.3577	0.3599	0.3621
1.1	0.3643	0.3665	0.3686	0.3708	0.3729	0.3749	0.3770	0.3790	0.3810	0.3830
1.2	0.3849	0.3869	0.3888	0.3907	0.3925	0.3944	0.3962	0.3980	0.3997	0.4015
1.3	0.4032	0.4049	0.4066	0.4082	0.4099	0.4115	0.4131	0.4147	0.4162	0.4177
1.4	0.4192	0.4207	0.4222	0.4236	0.4251	0.4265	0.4279	0.4292	0.4306	0.4319
1.5	0.4332	0.4345	0.4357	0.4370	0.4382	0.4394	0.4406	0.4418	0.4429	0.4441
1.6	0.4452	0.4463	0.4474	0.4484	0.4495	0.4505	0.4515	0.4525	0.4535	0.4545
1.7	0.4554	0.4564	0.4573	0.4582	0.4591	0.4599	0.4608	0.4616	0.4625	0.4633
1.8	0.4641	0.4649	0.4656	0.4664	0.4671	0.4678	0.4686	0.4693	0.4699	0.4706
1.9	0.4713	0.4719	0.4726	0.4732	0.4738	0.4744	0.4750	0.4756	0.4761	0.4767
2.0	0.4772	0.4778	0.4783	0.4788	0.4793	0.4798	0.4803	0.4808	0.4812	0.4817
2.1	0.4821	0.4826	0.4830	0.4834	0.4838	0.4842	0.4846	0.4850	0.4854	0.4857
2.2	0.4861	0.4864	0.4868	0.4871	0.4875	0.4878	0.4881	0.4884	0.4887	0.4890
2.3	0.4893	0.4896	0.4898	0.4901	0.4904	0.4906	0.4909	0.4911	0.4913	0.4916
2.4	0.4918	0.4920	0.4922	0.4925	0.4927	0.4929	0.4931	0.4932	0.4934	0.4936
2.5	0.4938	0.4940	0.4941	0.4943	0.4945	0.4946	0.4948	0.4949	0.4951	0.4952
2.6	0.4953	0.4955	0.4956	0.4957	0.4959	0.4960	0.4961	0.4962	0.4963	0.4964
2.7	0.4965	0.4966	0.4967	0.4968	0.4969	0.4970	0.4971	0.4972	0.4973	0.4974
2.8	0.4974	0.4975	0.4976	0.4977	0.4977	0.4978	0.4979	0.4979	0.4980	0.4981
2.9	0.4981	0.4982	0.4982	0.4983	0.4984	0.4984	0.4985	0.4985	0.4986	0.4986
3.0	0.4987	0.4987	0.4987	0.4988	0.4988	0.4989	0.4989	0.4989	0.4990	0.4990

