THE OPEN UNIVERSITY OF SRI LANKA

DEPARTMENT OF SOCIAL STUDIES

BA DEGREE IN SOCIAL SCIENCES – LEVEL 4 & 5

BA DEGREE IN YOUTH AND COMMUNITY DEVELOPMENT

FINAL EXAMINATION – 2021/2022 (2nd Semester)

DSE5301- STATISTICS FOR SOCIAL SCIENCES

DURATION: THREE HOURS (03 HOURS) ONLY

Date: 17th of February 2023	**Time: 9.30 a.m. – 12.30 p.m.**

Instructions:

➤ **Answer FIVE (05) questions ONLY.**

➤ **Each question carries equal marks.**

➤ **Use of non –programmable calculators are allowed.**

1. Suppose a researcher wish to estimate the average salary of a certain organization. Which has 900 employees.

   a) What is the population? How many data values are in the population?

   b) What is the parameter of interest?

   c) Suppose a sample of 10 workers is selected and their salaries (in Rs.) are 3500, 4800, 5300, 3500, 4200, 5000, 4000, 3800, 4000, and 4200. Calculate a statistic that you would use to estimate the parameter.

   d) Suppose that another sample of 10 workers is selected, would it be likely that the value of the statistic is the same as in part(c)? Why or why not? Would the value of the parameter remain the same?

   (20 marks)

2.
   a) Consider a research problem from your own field and classify the variables as discrete or continuous.

   b) Give examples for each of the following
      i. Nominal and Interval
      ii. Ratio and ordinal

   c) Describe a ratio variable from you own area of research.

d) Determine the scale of measurements in each of the following.

    i.   Times taken by a group of runners to complete a 400m event

    ii.   Ranks of the runners based on the times referred in part (i)

(20 marks)

3. From one school, 80 girls were asked about their favorite sport? The collected information is given in the table below.

Sports	Number of Girls
Badminton	41
Tennis	09
Swimming	23
Volleyball	07

a) Read the information and draw a pie chart.

b) Which is the most favorite sport activity of students?

c) How many students like Swimming?

d) What percentage of students like to Tennis?

e) What percentage of students likes to play volleyball?

(20 marks)

4. The height of a specific plant to the closest centimeter is tabulated in the table below.

Height (cm)	20-22	23-25	26-28	29-31	32-34
No of Trees(f)	3	6	12	9	2

Find the values of, Mean, Variance, standard deviation and comment on the shape of the distribution.

(20 marks)

5.
   a) Discuss the characteristics of a normal or bell-shaped curve.

   b) Using Z table

     i.   Find the area under the normal distributing curve between $Z= -0.83$ and $Z= 1.67$

ii. Find the area to the left of Z=2

iii. Find the area to the right of Z=2.5

iv. Find the area to the left of Z= -1.5 .

v. Find the area under the normal distributing curve between Z= -0.81 and Z= 0.56

(20 marks)

6. An assembly line contains 2,000 of a component which has a limited life. Records show that the life of the components is normally distributed with a mean of 900 hours and a standard deviation of 80 hours.

a) What proportion of components will fail before 1,000 hours?

b) What proportion will fail before 750 hours?

c) What proportion of components fail between 850 and 880 hours?

(20 marks)

7. Measurements of the IQ of 202 people selected at random produced the following results.

Mean IQ= 105, standard deviation = 10

a) Calculate the standard error of the mean

b) Estimates the confidence limits of the mean IQ and interpret the results

i. With 95 percent confidence

ii. With 99 percent confidence

iii. With 90 percent confidence

(20 marks)

8.

a) Define null and alternative hypothesis and give an example of each.

b) What is the procedure for testing a hypothesis?

c) Illustrate how hypotheses should be stated: in the following instances.

i. A psychologist feels that playing music during a test will change the results of the test. The psychologist is not sure whether the grade will be higher or lower. in the past, the mean of the score was 75

ii. A researcher thinks that if expectant mothers use vitamin pills, the birth weight of the babies will increase. The average birth weight of the population is 8.7 pounds

iii. An engineer hypothesizes that the mean number of defects can be decreased in a manufacturing process of compact disks by using robots instead of humans for certain tasks. The mean number of defective disks per 1000 is 20.

iv. In 2019, mothers mean age at 1st birth of her baby was recoded as 25 years, suppose that a researcher hypothesized that the mean age of a mother at 1st birth is less than 25 years.

(20 marks)

9. A machine is designed to produce metal bars of a length of 420 cm. It is known that the length of the metal bar is normally disrupted with mean 420 cm and standard deviation 12cm. After the machine was serviced, it was required to test whether the machine setting has been changed. A sample of 100 bars was examined and was found to have a mean 423cm. Assuming that the variance is unaltered.

    a) State the appropriate null and alternative hypotheses.

    b) What is the critical value at a 5 % level of significance?

    c) Is there evidence that at a 5% level of significance. the machine setting has been changed? (Conduct the test using critical - value)

(20 marks)

Table A: Standard Normal (Z) table

	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

Z values greater than 3.09 produce a probability of .5000

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