



THE OPEN UNIVERSITY OF SRI LANKA
FACULTY OF HEALTH SCIENCES
DEPARTMENT OF BASIC SCIENCES
ACADEMIC YEAR 2022/2023 – SEMESTER 01
BACHELOR OF PHARMACY HONOURS
BACHELOR OF MEDICAL LABORATORY SCIENCES HONOURS



BSU4230 – BASIC STATISTICS – LEVEL 04
FINAL EXAMINATION
DURATION: TWO HOURS

DATE: 24th of March 2023

TIME: 2.00 pm- 4.00 pm

INDEX NO:

IMPORTANT INSTRUCTIONS / INFORMATION TO CANDIDATES

- This question paper consists of **05 pages** with **04 Essay Questions**:
 - Essay Questions (a total of 200 marks): There are 04 essay questions. Write answers in the answer books provided.
- Necessary Formulae/ Z table are given in the page 5.
- Answer **ALL** questions.
- Write your **Index Number** in the space provided.
- Do **NOT** bring in on person or have in possession unauthorized materials, including mobile phones and other electronic devices, or violate any other examination rules.
- **Non-programmable calculators are allowed to use.**

BSU4230-BASIC STATISTICS
FINAL EXAMINATION

Essay Questions
(Total marks:200)

- 1.
- a) A research study on obesity was done using a sample of two hundred (200) patients in a hospital. The variables investigated were BMI value (kg/m^2), age (recorded as less than 30 years, 31 to 50 years, above 50 years), marital status, blood pressure (mmHg), family history of obesity (recorded as 1: yes and 0: no), resting heart rate, level of physical activity (recorded as: inactive, somewhat active, fairly active, very active) and number of admissions to the hospital within last 6 months. .
- i. Identify the scale of measurement (nominal, Ordinal, interval, or ratio) for each of the study variables (8 marks)
 - ii. Classify the study variables as either quantitative or qualitative. (8 marks)
 - iii. Classify the quantitative variables as either discrete or continuous. (4 marks)
 - iv. Suppose the mean weight of male patients was 65 kg with a standard deviation of 2.6 kg and the mean weight of female patients was 50 kg with a standard deviation of 2.4 kg. Calculate the coefficient of variation for both male and female as a percentage. (8 marks)
 - v. Comment on the variability in the weights of male and female patients. (2 marks)
- b) The following data shows the number of admissions of a randomly selected 25 patients in a hospital during the last 5 years.
- 20, 10, 32, 41, 20, 11, 32, 22, 15, 19, 23, 33, 23, 35, 25, 15, 36, 32, 27, 17, 27, 18, 28, 28, 29
- i. Construct the stem and leaf plot for the number of admissions of the patient. (10 marks)
 - ii. Find the median and mode of the given data set. (10 marks)
- 2.
- a) A study was conducted to investigate the risk of regular exposure to dust at workplace in developing cough problem. In a sample of 500 persons, 20% reported as having regular exposure to dust and 80% reported as not having regular exposure to dust at workplace. Among the person who had regular exposure to dust, 20 had visited a doctor and the rest had not made any doctor visits for cough problems. Among the person who had no regular exposure to dust, 40 had visited a doctor for cough problems and the rest had not.
- i. What is the type of study design used in this investigation? (2 marks)
 - ii. Construct a 2×2 table using the data. (8 marks)
 - iii. Calculate the odd ratio of the relationship between doctor visits and exposure to dust summarized in part (ii) and interpret it. (15 marks)
 - iv. Determine whether regular exposure to dust at workplace is associated with having cough problems. (5 marks)

b) Explain the differences between the following terms. (20 marks)

- i. Census and Sampling
- ii. Probability sampling and non-probability sampling.
- iii. Experimental study and Observational study.
- iv. Retrospective study and Prospective study

3.

a)

i. Sketch the shape of following distribution and indicate the positions of mean, median and mode on the graph. (18 marks)

- a) Normal distribution.
- b) Positively skewed distribution.
- c) Negatively skewed distribution.

ii. List 2 unique characteristics of the Standard Normal distribution. (2 marks)

iii. Suppose the height of a group of adult males are normally distributed with mean of 165 cm and standard deviation of 8 cm. Find the probability that a randomly selected adult male from this group has a height greater than 145 cm using the Z table. (10 marks)

b) A total of 400 patients had undergone a screening test. There were 180 True Positives, 8 False Positives, 190 True Negatives and 22 False Negatives.

i. Explain the terms Sensitivity and Specificity. (4 marks)

ii. Calculate the followings as a percentage. (16 marks)

- a) Sensitivity
- b) Specificity
- c) PPV (Positive Predictive Value)
- d) NPV (Negative Predictive Value)

4.

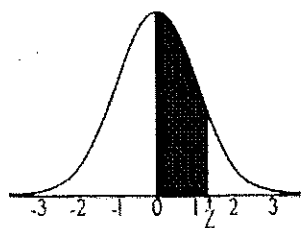
a) The following table was constructed using the ages of 100 mothers at the birth of their first child, reported in a particular hospital in Sri Lanka.

Age (x)	Number of Mothers (f)
17	18
22	42
27	30
32	6
37	4

i. Calculate the sample mean and interpret the value in relation to this study. (10 marks)

ii. Calculate the relative frequencies and cumulative frequency percentages. (10 marks)

- iii. What is the probability of the age of a randomly selected mother is,
- a.) less than 22 years.
 - b.) greater than or equal to 32 years. (10 marks)
- b) It was observed that 2 out of randomly selected 10 group of elders in a rural region suffer from cardiovascular diseases. Suppose there were 12000 elders in that region.
- i. Estimate the proportion of elders in that rural region suffering from cardiovascular diseases. (4 marks)
 - ii. Estimate the standard error of the estimate calculated in part (i). (12 marks)
 - iii. Estimate the total number of elders in the rural region suffering from cardiovascular diseases. (4 marks)



STANDARD NORMAL TABLE (Z)

Entries in the table give the area under the curve between the mean and z standard deviations above the mean. For example, for $z = 1.25$ the area under the curve between the mean (0) and z is 0.3944.

	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	0.0190	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	0.2969	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	0.3513	0.3554	0.3577	0.3529	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
3.1	0.4990	0.4991	0.4991	0.4991	0.4992	0.4992	0.4992	0.4992	0.4993	0.4993
3.2	0.4993	0.4993	0.4994	0.4994	0.4994	0.4994	0.4994	0.4995	0.4995	0.4995
3.3	0.4995	0.4995	0.4995	0.4996	0.4996	0.4996	0.4996	0.4996	0.4996	0.4997
3.4	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4998

