

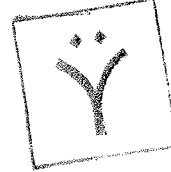
00637

THE OPEN UNIVERSITY OF SRI LANKA  
FACULTY OF HEALTH SCIENCES  
DEPARTMENT OF BASIC SCIENCES  
ACADEMIC YEAR 2024/2025 – SEMESTER 01  
BACHELOR OF SCIENCE HONOURS IN NURSING  
BSU5335 – HEALTH STATISTICS – LEVEL 05  
FINAL EXAMINATION  
DURATION: 3 HOURS

30  
OF

APR 2025

SION



---

DATE: 30<sup>th</sup> April 2025

TIME: 1.30 pm – 4.30 pm

---

INDEX NO: .....

---

**Part B – Structured Essay Questions****(15 \* 1 = 15 Marks)**

---

This question is **a compulsory question**. Write the answer within the space provided in the question paper.

01. a)
- i. List 2 Discrete probability distributions. **(2 Marks)**
  
  - ii. List 2 Non-Probability Sampling Techniques. **(2 Marks)**
  
  - iii. Briefly explain the difference between diagnostic test and screening test. **(3 Marks)**

b) Given that mean  $\mu = 10$ , standard deviation  $\sigma = 5$ , use the standard normal distribution table to calculate the probabilities:

i.  $P(10 < X < 15)$  (4 Marks)

ii.  $P(-25 < X < 5)$  (4 Marks)

INDEX NO: .....

---

**Part C – Structured Essay Questions**
**(15 \* 3 = 45 Marks)**


---

There are 5 structured essay questions. Write answers for **only three** questions in the answer books provided.

01. Find the answers to the following questions using the following data set.

9,2,7,10,12,4,10,8,3,10

- a) Calculate the mean, median and mode of the data set. (5 Marks)  
 b) Complete the following table. (Copy this table into your answer sheet.) (5 Marks)

$x_i$	$(x_i - \bar{x})$	$(x_i - \bar{x})^2$
9		
2		
7		
10		
12		
4		
10		
8		
3		
10		

- c) Calculate the variance of the data set. (3 Marks)  
 d) Compute the coefficient of variation. (2 Marks)

02. A biologist assumes that there is a linear relationship between the amount of fertilizer supplied to tomato plants and the subsequent yield of tomatoes obtained. Eight tomato plants, of the same variety, were selected at random and treated. Weekly, with a solution in which x grams of fertilizer was dissolved in a fixed quantity of water. The yield, y kilograms, of tomatoes was recorded.

Plant	x	y
A	1.0	3.9
B	1.5	4.4
C	2.0	5.8
D	2.5	6.6
E	3.0	7.0
F	3.5	7.1
G	4.0	7.3
H	4.5	7.7

- a) Calculate the slope and intercept parameters. **(10 Marks)**  
 b) Obtain the equation of the regression line of  $y$  on  $x$ . **(3 Marks)**  
 c) Estimate the yield of a plant treated, weekly with 3.2 grams of fertilizer. **(2 Marks)**

03. An agricultural research organization tested a particular chemical fertilizer to try to find out whether an increase in the amount of fertilizer used would lead to a corresponding increase in the food supply.

Fertilizer (lbs)	Bushels of Beans
2	4
1	3
3	4
2	3
4	6
5	5
3	5

- a) Draw a scatter plot to represent the relationship between fertilizer and bushels of beans. **(4 Marks)**  
 b) Calculate the correlation coefficient. **(8 Marks)**  
 c) Interpret the result obtained in part (b). **(3 Marks)**

04. Light dances are performed at a local dance competition. After seeing all the dances, two judges rank the dances in order so the dance each judge likes best has rank 1.

Dance	Judge 1	Judge 2
A	1	4
B	7	3
C	2	6
D	3	7
E	5	1
F	4	8
G	6	5
H	8	2

- a) What is the key difference between parametric and non-parametric tests? **(3 Marks)**  
 b) Calculate Spearman's rank correlation coefficient ( $\rho$ ) for the rankings given by Judge 1 and Judge 2. **(9 Marks)**  
 c) Interpret the result of the correlation coefficient in the context of the judges' agreement on the dances. **(3 Marks)**

05. A public health study investigates the relationship between physical activity level and the type of dietary pattern followed by adults. Data were collected from 620 individuals, categorized based on their physical activity level (Low, Moderate, High) and their dietary pattern (Vegetarian, Non-Vegetarian). The collected data are shown below:

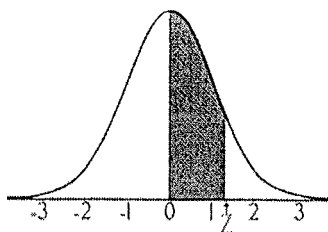
	Low	Moderate	High
Vegetarian	40	70	60
Non-Vegetarian	110	180	160

- Calculate the expected frequencies for each category. **(6 Marks)**
- State the null hypothesis ( $H_0$ ) and the alternative hypothesis ( $H_1$ ) for this analysis. **(2 Marks)**
- Perform the Chi-square test of independence. **(5 Marks)**
- Interpret the results of your analysis in the context of the impact of physical activity on dietary choices. **(2 Marks)**

-----END OF QUESTION PAPER-----

## NECESSARY STATISTICAL TABLES

## Z TABLE



## 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.

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	0.0190	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

## WILCOXON SIGNED-RANKS TABLE

Two-Sided Test $\alpha$	0.1	0.05	0.02	0.01
One-Sided Test $\alpha$	0.05	0.025	,01	0.005
$n$				
5	1			
6	2	1		
7	4	2	0	
8	6	4	2	0
9	8	6	3	2
10	11	8	5	3
11	14	11	7	5
12	17	14	19	7
13	21	17	13	10
14	26	21	16	13
15	30	25	20	16
16	36	30	24	19
17	41	35	28	23
18	47	40	33	28
19	54	46	38	32
20	60	52	43	37
21	68	59	49	43
22	75	66	56	49
23	83	73	62	55
24	92	81	69	61
25	101	90	77	68
26	110	98	85	76
27	120	107	93	84
28	130	112	102	92
29	141	127	111	100
30	152	137	120	109

## CHI-SQUARE TABLE

Chi-square Distribution Table

d.f.	.995	.99	.975	.95	.9	.1	.05	.025	.01
1	0.00	0.00	0.00	0.00	0.02	2.71	3.84	5.02	6.63
2	0.01	0.02	0.05	0.10	0.21	4.61	5.99	7.38	9.21
3	0.07	0.11	0.22	0.35	0.58	6.25	7.81	9.35	11.34
4	0.21	0.30	0.48	0.71	1.06	7.78	9.49	11.14	13.28
5	0.41	0.55	0.83	1.15	1.61	9.24	11.07	12.83	15.09
6	0.68	0.87	1.24	1.64	2.20	10.64	12.59	14.45	16.81
7	0.99	1.24	1.69	2.17	2.83	12.02	14.07	16.01	18.48
8	1.34	1.65	2.18	2.73	3.49	13.36	15.51	17.53	20.09
9	1.73	2.09	2.70	3.33	4.17	14.68	16.92	19.02	21.67
10	2.16	2.56	3.25	3.94	4.87	15.99	18.31	20.48	23.21

## NECESSARY STATISTICAL EQUATIONS

$$\text{Slope } a = \frac{\sum(x_i - \bar{x})(y_i - \bar{y})}{\sum(x_i - \bar{x})^2}$$

$$\text{intercept } b = \bar{y} - a\bar{x}$$

$$r = \frac{\sum(x - \bar{x})(y - \bar{y})}{\sqrt{\sum(x - \bar{x})^2 \sum(y - \bar{y})^2}}$$

$$r_s = 1 - \frac{6 \sum D^2}{n(n^2 - 1)}$$

$$\chi^2 = \sum \frac{(O - E)^2}{E}$$