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## UNIVERSITY OF RUHUNA - FACULTY OF CALLS

DEPARTMENT OF PHARWINE Sity of Ruhuna

SECOND BPHARM PART I EXAMINATION – JANUARY/FEBRUARY 2023

PH2143 BIOSTATISTICS II - SEQ PAPER

EXAM THATHRA HOURS

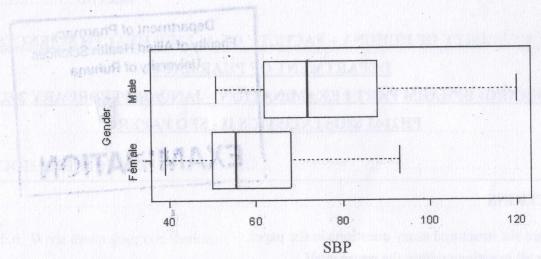
Department of Pharma

## **INSTRUCTIONS**

- There are six structured essay questions in the paper.
- Answer all questions within the paper itself.
- No paper should be removed from the examination hall.
- Do not use any correction fluid.
- Use illustrations where necessary.
- The Z table, Chi square table and the t table are provided.

| 1.1. List three us | ses of statistics in Pharmacy practice.   | (30 marks)                  |
|--------------------|---|-----------------------------|
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| b                  |   |                             |
| c                  | enstwymanyth-65, i daw ceminega to enstrenneg edi sedwoda e   | agona kil                   |
| knowledge          | ist investigated the prevalence of chronic diseases, hemoglobin (Foundamental using a sample of 250 adults. Among the participant definition of the total sample was 34 to 56 years.) | s, there were 80            |
|                    | e down one example for each of the following types of variables uarch study.  | sed in the above (20 marks) |
| a. 1               | Nominal variable  |                             |
| b. 1               | Binary variable   |                             |
| c. 1               | Interval scale variable   |                             |
| d. ]               | Discrete variable   |                             |

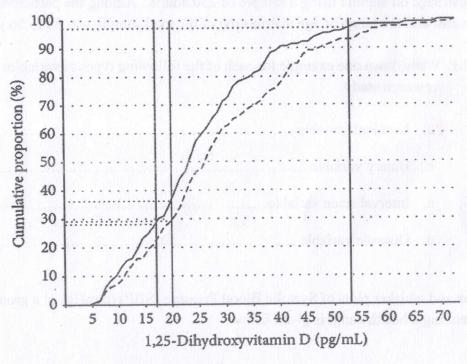
1.3. Box and whisker plots of Systolic Blood Pressure (SBP) (mmHg) of a group of young adults attending a health camp is given below.



Answer the question using the figure given above. (Approximate answers are accepted, if the exact answer cannot be observed directly) (20 marks)

| 1.3.1. | What is the upper quartile value of the female group?                |
|--------|--|
| 1.3.2. | What is the minimum SPB observed in females?                         |
| 1.3.3. | What is the Q <sub>2</sub> value of the male group?                  |
| 1.3.4. | What is the Inter Quartile Range (IQR) of the SBP of the male group? |

1.4. An ogive showing the percentage of specimen with 1,25-dihydroxyvitamin D concentrations below a certain value according to test procedure. The vertical lines mark different cut-off levels for deficient or harmful 1,25-dihydroxyvitamin D concentrations.



— LC-MS/MS method

--- Automated assay

|                | D concentrations according to the LC-MS/MS method? (15 marks)   |
|----------------|---|
|                |   |
| 2010           | 1.4.2. Approximately what percentage of specimen showed 1,25-dihydroxyvitamin D concentration (pg/mL) of 20 - 40 (pg/mL) according to the automated assay method? (15 marks)  |
| •              | §.  |
| 2              |   |
| <b>2.</b> 2:1. | Suppose the occurrence of anemia has no influence on the development of social phobia (Thus the two events can be considered as independent events). Suppose the probability of having anaemia is 0.4 and the probability of having social phobia is 0.8 among school children in Southern Sri Lanka. |
|                | 2.1.1. What is the probability of having both anemia and social phobia in a randomly selected child from this population? (15 marks)  |
|                |   |
|                |   |
|                |   |
|                | 3.24 X, 46 and X = N = 0.25   |
|                | Z.3. Suggest the best sampling atothod tall or had to have to have pure queen and the following reservoir   |
|                | The Body Mass Index (SML) of a group of district patients to 2019 are remained in the band  |
|                | 2.1.2. What is the probability of having either anemia or social phobia or both in a randomly   |
|                | selected school child from this population? (15 marks)  |
|                | (2.3.2.) A assessment is interested in examining the level of surishedion of the citicuts art   |
|                |   |
|                |   |
|                | 2.3.5. A researcher is unerested in examining personality problems to a group of  |
|                |   |
|                |   |

| 2.2.1. What is the probability that exactly four arrivals occur of  | (15 marks)                                   |
|---|--|
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| #2 <u>11</u>  |  |
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| Full Committee on a partners of the Section Section 1995 and process to so                                  |  |
| and nearconsidered as independent events). Surpress the property  |  |
|   |  |
| 2.2.2. What is the probability that at least three people arrive  | during a particular hour?                    |
| and the first to the essents and robert present in the profession of the sample and                         |  |
| el Prija. The the site the value of the make group? It is a constanting                                     | olst rard ballocatery                        |
| 4.13 (81) When an item arder Chambile Manager (80,175) and their \$125-1 or the                             |  |
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| Autograe shown to the necessarias entrancement and deleterations.   |  |
|   | Times verific of there is a serie            |
|   |  |
| <ol> <li>Suggest the best sampling method that can be used to select<br/>the following research.</li> </ol> | t study participants for each of             |
| 2.3.1. A researcher is interested in identifying the mean se  | rum creatinine level of adults               |
| living in Polonnaruwa district.   | (10 marks)                                   |
| a e.s.) Languaga eide an il bildo   |  |
|   |  |
| 2.3.2. A researcher is interested in examining the level of sati<br>a Pharmacy in Galle.                    | sfaction of the clients attending (10 marks) |
|   |  |
| 2.3.3. A researcher is interested in examining personality  | problems in a group of heroi                 |
| addicts in an urban slum.   | (10 mag 11 m)                                |

2.2. The number of people arriving at a pharmacy can be modelled by a Poisson distribution with

a rate parameter ( $\lambda$ ) of 5 per hour.

| 2.3.4. A researcher is interested in examining Body Mass Index (BMI) pregnant women registered in an MOH clinic.   |                                  |
|--|----------------------------------|
|  |                                  |
| 3.   |                                  |
| 3.1. List three (03) characteristics of a normal distribution.   | (15 marks)                       |
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| $C_{ij} = C_{ij} + C$ | V.000.08                         |
|  |                                  |
| 3.2. Convert the following raw data into Z values.   | (20 marks)                       |
| 3.2.1. $X = 34$ and $X \sim N(30, 10)$   |                                  |
| 3.2.2. $X = 5$ and $X \sim N(2, 1)$  |                                  |
|  |                                  |
| 3.2.3. $X = -5$ and $X \sim N(2, 4)$   |                                  |
| 3.2.4. $X = 10$ and $X \sim N(0, 5)$   |                                  |
| 3.3. The Body Mass Index (BMI) of a group of diabetes patients ( $n = 200$ ) are norm with the mean of 25 Kg/m <sup>2</sup> and SD of 4 Kg/m <sup>2</sup> .  | mally distributed                |
| 3.3.1. How many patients would you expect to be having BMI less than 3   | 0 Kg/m <sup>2</sup> ? (10 marks) |
|  |                                  |
|  |                                  |
| Hypertensive (Kon-Hypertensive   |                                  |
| Smolding IT.   |                                  |
|  |                                  |
|  |                                  |

| 3.3.2. If we define obese as those who are having BMI (Kg/m²) 30 or proportion of patients in this sample was obese?        | more, what (10 marks)         |
|---|-------------------------------|
|   | er Moraya<br>Maria Salama (S) |
| 3.4. In a sample of 100 patients with dengue hemorrhagic fever, the mean platel   | let count was                 |
| 80, 000 / $\mu$ l (SD = 10,000 / $\mu$ l).  |                               |
| . 3.4.1. Calculate 95% CI of the population mean platelet count?  | (25 marks)                    |
| ri the Million and clubs into 2 velues.   | 19805 Z                       |
|   |                               |
|   |                               |
| 3.4.2. How do you interpret this result?  | (20 marks)                    |
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| <ol> <li>Successful the these some plants, and plants the consideration of the construction of the construction.</li> </ol> |                               |

4.4.1. A study was conducted using a sample of 100 males to see whether there is a relationship between smoking and high blood pressure. Results are given below.

## **Blood Pressure**

|         |     | Hypertensive | Non-Hypertensive |
|---------|-----|--------------|------------------|
|         | Yes | 40           | 20               |
| Smoking | No  | 10           | 30               |

| 4.1.1. State null and alternative hypothesis.  | (20 marks)                              |
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| 5 FO Time in the vice codem variable to the above data set?  |   |
|  |   |
|  |   |
| A 1 2 C 1 1 1 4 1 2 2 4 1 2 1 2 2 4 1 2 1 2 2 2 2  | (20 marks)                              |
| 4.1.2. Calculate expected values for the observed values.  | (20 marks)                              |
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| e vote conclusion. 18 19 19 19 19 19 19 19 19 19 19 19 19 19   | mW A14                                  |
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| 5, r.4. Calculate conslution coefficient (r) using the tost 2-ving aquivi  | 010 (29 896683)                         |
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| ydad cala li   |   |
| 4.1.3. Test the null hypothesis at 5% level.   | (40 marks)                              |
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| 4.1.4. Write your conclusion.  | (20 marks)                              |
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5.1. Apgar is a quick test performed on a baby at 5 minutes after birth to check how well the baby is doing outside the mother's womb. The scores ranges from 0 to 10. The Apgar score and birth weight of 10 babies are given below.

| Apgar Score | Birth Weight      | $X_iY_i$   | $X_i^2$       | $Y_i^2$  |
|-------------|-------------------|--|---------------|--|
| $(Y_i)$     | (X <sub>i</sub> ) | Λ <sub>1</sub> 1 <sub>1</sub>  | $\Lambda_1$   | 11   |
| 1           | 1.5               |  |               |  |
| 3           | 2.5               |  |               | are a second   |
| 2           | 2                 |  |               |  |
| 4           | 3                 |  |               |  |
| 5           | 3.5               |  |               |  |
| 3           | 2                 |  |               |  |
| 4           | 3.5               |  |               |  |
| 3           | 2                 |  |               |  |
| 2           | 2                 | A Committee of the Comm |               | and the second s |
| 3           | 3                 |  |               |  |
| ∑Yi =       | ∑Xi =             | ∑XiYi =  | $\sum Xi^2 =$ | $\sum Yi^2 =$  |

| <br>5.1.1. What is the independent variable in the above dataset?  | (05 marks) |
|--|------------|
|  |            |
| 5.1.2. What is the dependent variable in the above data set?   | (05 marks) |
|  |            |
| 5.1.3. Calculate, (SF) nother many to be described as a state of the s | (20 marks) |
| $\sum Y_i$   |            |
| $\sum X_i$   |            |
| $\sum Y_i 2$   |            |
| $\sum X_i 2$   |            |
| $\sum X_i Y_i$   |            |
| 5.1.4. Calculate correlation coefficient (r) using the following equation.   | (20 marks) |
| G.3. Can note that test the first the nett hypothesis mennoned in 6.1.   |            |
| $n \sum n = (\sum x)(\sum n)$  |            |
| $r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2} \sqrt{n(\sum y^2) - (\sum y)^2}}$  |            |
| $V^{n}(Z^{\infty})^{-}(Z^{\infty})V^{n}(Z^{\infty})^{-}(Z^{\infty})$   |            |
| ologist claims that cadiotherapy is constantive than eligenchange for entirets with  | A          |
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| with warmland deviation of a months for the calabharagy group and the corresponding on the other group were. At months and of 5 months.  |            |
| A design of the contract of the first forced property and the first forced property and the contract of the co |            |
| a. To What is the table online?  | (10 marks) |
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|               | 5.1.5. Interpret correlation coefficient (r).   | (10 marks)                                |  |
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|               |   |   |  |
| 1.00          | 5.1.6. Calculate coefficient of determination (R <sup>2</sup> ).  | (20 marks)                                |  |
|               |   |   |  |
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|               |   | v   |  |
|               |   |   |  |
|               |   |   |  |
|               | 5.1.7. How would you interpret the value you got for the coefficient  | of determination? (20 marks)              |  |
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| prost         | Oncologist claims that radiotherapy is more effective than chemotherate cancer in increasing survival time. He compared the survival rates  | of 49 older men who                       |  |
| mont          | radiotherapy with 44 older men who had chemotherapy. The mean this with standard deviation of 4 months for the radiotherapy group at es for the other group were 20 months and of 5 months.   | survival time was 25 nd the corresponding |  |
| 6.1. W        | rite down the null and alternative hypothesis.  | (10 marks)                                |  |
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|        | $\sqrt{\frac{{\sigma_1}^2}{n_1} + \frac{{\sigma_2}^2}{n_2}}$   |              |
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| 6.3. C | Calculate the test statistic to test the null hypothesis mentioned in 6.1.   | (30 marks)   |
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|        | sowiedge og anemia using a sample of 250 sdahs. Among the parsicipants   |              |
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| 6.4. V | What is the table value?   | (10 marks)   |
|        | County while a plots of a stake Blood Fressure (68P) (mod/p) et a groue o  | d rouse more |
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6.2. Calculate the standard error for the mean difference of two groups using the following

equation.

(20 marks)

|      |   | 250   | *10                                     |            |
|------|---|-------|---|------------|
|      |   | SIL   | 150 1/2                                 |            |
|      |   |       |   |            |
| 6.6. | Write down your conclusion.             |       | maken (RP)                              | (10 marks) |
|      | *************************************** |       |   |            |
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