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RAJARATA UNIVERSITY OF SRI LANKA
FACULTY OF APPLIED SCIENCES

B.Sc. in Health Promotion
First Year – Semester II Examination – September/October 2020

HPT 1213 – Statistical Methods in Health Research

Time: Two (02) hours

Answer ALL questions.

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1. a) List **five (05)** differences between ordinal and nominal variable (15 Marks)

   b) Indicate whether the following variables are continuous or discrete
      i. Family income
      ii. Number of group discussions
      iii. Blood sugar level of individuals
      iv. Mid-arm circumference
      v. Number of home deliveries in a PHM area (15 Marks)

   c) Explain advantages and disadvantages of transforming continuous variables into categorical (ordinal) before analysis? (35 Marks)

d) Listed in the below table is the annual per capita health care expenditure of 23 countries

Country	Annual per capita health care expenditure (in U.S.$)
Australia	1032
Austria	1093
Belgium	980
Britain	836
Canada	1683
Denmark	912
Finland	1067
France	1274
Germany	1232
India	215
Iceland	1353
Ireland	658
Italy	1050
Japan	1035
Luxembourg	1193
Netherlands	1135
New Zealand	820
Norway	1234
Indonesia	293
Sweden	1361
Switzerland	1376
USA	2354

i. Determine the outliers in above GDP data by using Inter Quartile Range (IQR) (35 Marks)

2. a) Consider the following three data sets A, B and C

A = {9, 10, 11, 7, 13, 12, 11, 13, 12, 11.5, 12.5}
B = {10, 10, 10, 10, 10, 9, 9, 10, 10, 10.5, 10, 9, 9.5}
C = {6, 6, 16, 19, 18, 15, 14, 17, 15, 15, 16, 17, 16}

i. Calculate the mean, standard deviation and median of each dataset (30 Marks)

ii. Identify by giving reasons, in which dataset the median is more appropriate than mean (20 Marks)

b) Interpret the data values included in a given dataset if the standard deviation is equal to Zero (0). (30 Marks)

c) Discuss the following observation "In year 2000, the mean weight of 10 year olds was found to be 27 kg and the standard deviation was 3.5. In 2010 the mean weight of 10 year olds was found to be 29 kg and the standard deviation was 2.1." (35 Marks)

3. a) Explain the difference between a standard deviation and a standard error? (20 Marks)

b) Calculate 95% confidence interval for the following group "A group of 20 diabetes patients had a mean weight of 65 kg. The sample standard deviation was 5 kg" (Use the given t-distribution table for your calculation) (40 Marks)

c) Describe what will happen to the 95% confidence interval if the sample size is increased. (20 Marks)

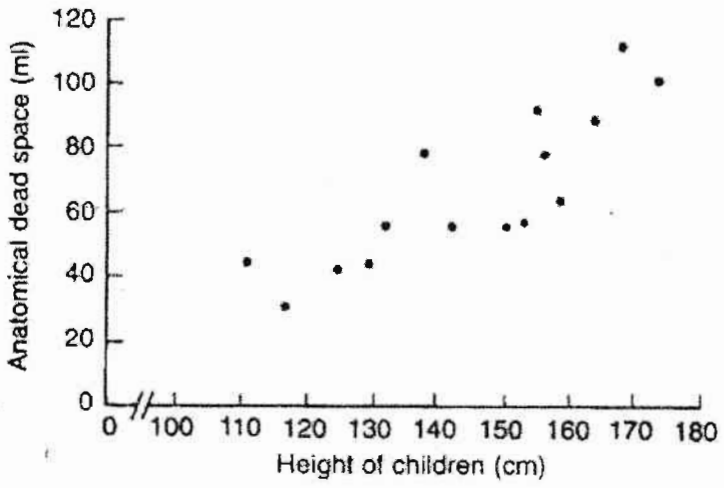
d) Interpret the confidence interval of following example. "In a study to estimate the mean age of graduate students in a large university, a random sample of 30 graduate students was selected and their mean age was calculated as 31.8 years with the standard deviation 4.3 years. A 95% confidence interval for the mean based on this data was calculated as (30.2, 33.4)." (20 Marks)

4. a) Explain the importance of creating a scatter plot when investigating the relationship between two continuous random variables? (25 Marks)

b) Outline the difference between Pearson's correlation and Spearman's correlation (20 Marks)

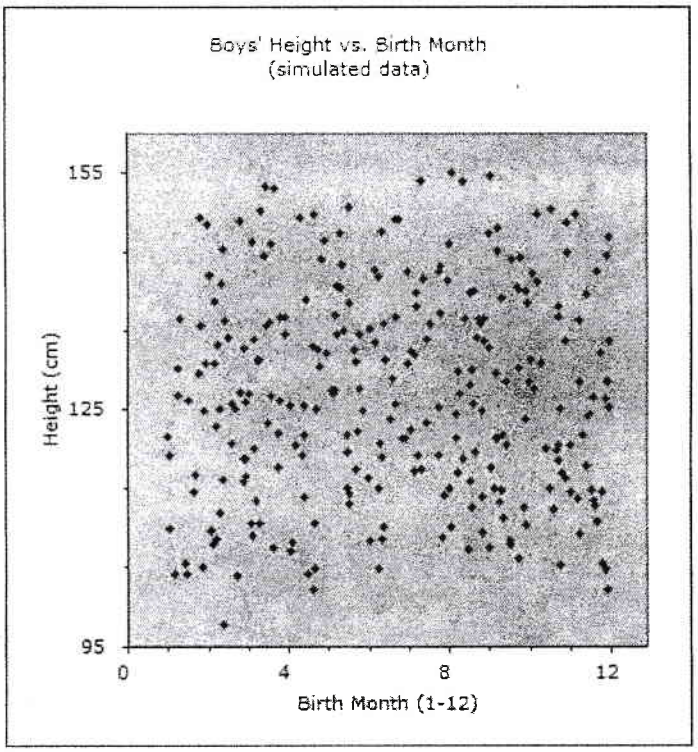
c) Describe the level of relationship of the scatter plots given below

i. The relationships between pulmonary anatomical dead space (in ml) and height of children (15 Marks)



ii. The relationship between age of the driver and the maximum distance to read road traffic signs (15 Marks)

iii. The relationship between the height of the boys and their birth month (15 Marks)



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List of Equations

$$\bar{x} = \frac{\sum_{i=1}^{n} x_i}{n}$$

$$s = \sqrt{\frac{\sum (x - \bar{x})^2}{n - 1}}$$

$$\bar{x} - 1.96\frac{\sigma}{\sqrt{n}} < \mu < \bar{x} + 1.96\frac{\sigma}{\sqrt{n}}$$

$$z = \frac{\bar{x} - \mu_0}{\frac{\sigma}{\sqrt{n}}}$$

$$r = \frac{1}{n-1} \Sigma \left(\frac{x - \bar{x}}{s_x}\right)\left(\frac{y - \bar{y}}{s_y}\right)$$