Uva Wellassa University of Sri Lanka
Faculty of Science and Technology
Department of Science and Technology
100 level 2nd Semester Examination – Dec. /Jan. 2018/19
ESD 141-2 Quantitative Reasoning

Uva Wellassa University

2. The data given below are the numbers (in thousands) of farms in each of the 50 states of the USA in 2016, given in order of increasing numbers of farms.

1	1	2	3	3	4	4	6	7	8
8	9	9	14	14	17	21	24	24	27
28	33	36	36	37	38	39	42	46	49
50	50	52	57	57	61	70	71	73	78
79	82	87	88	93	96	99	109	115	160

[Note: $\sum_{i=1}^{50} x_i = 2217$ and $\sum_{i=1}^{50} x_i^2 = 164441$]

i. Draw a stem and leaf diagram to display these data. Briefly discuss whether the data appear to be symmetrical or skew with appropriate kurtosis measure. (8 mark)

ii. Compute and compare the median and mean. (6 mark)

iii. Compute and comapre standard deviation and inter-quartile range. (8 mark)

iv. State, with reasons, which measure of central location you consider more appropriate for summarising these data. Interpret the results for this measure with the corresponding measure of variability (or spread). (6 mark)

3. The table shows some recent data for the six largest Caribbean states by size of population. 'GDP per person' is a measure of the overall wealth of the country in relation to the size of its population.

	GDP per person (thousands of US $)	*Number of doctors per 1000 people*
Cuba	6.1	0.40
Haiti	1.7	0.25
Dominican Republic	15.8	1.88
Puerto Rico	28.5	1.75
Jamaica	5.3	0.85
Trinidad and Tobago	18.4	1.18

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i. Draw a scatter diagram for these data. (5 mark)

ii. Find the value of Spearman's rank correlation coefficient for these data. (5 mark)

You are now **given** that the product moment correlation coefficient for these data is 0.845.

iii. Comment briefly on the difference in the values of the two correlation coefficients. (4 mark)

iv. Discuss briefly the relationship between GDP and numbers of doctors for these six (06) countries. You should refer to your diagram and to the correlation coefficients in your answer. (5 mark)

v. Find the best fitted Regression line to express above relationship. (8 mark)

Useful Formula

1. $r = 1 - 6\sum \frac{d_i^2}{n(n^2-1)}$

2. $r = \frac{\left(\sum_{i=1}^{n} X_i Y_i - n\bar{X}\bar{Y}\right)}{\sqrt{(\sum_{i=1}^{n} X_i^2 - n\bar{X}^2)(\sum_{i=1}^{n} Y_i^2 - n\bar{Y}^2)}}$

3. $\beta_1 = \frac{\left(\sum_{i=1}^{n} X_i Y_i - n\bar{X}\bar{Y}\right)}{(\sum_{i=1}^{n} X_i^2 - n\bar{X}^2)}$

4. $\beta_0 = \bar{Y} - \beta_1 \bar{X}$

5. $Mode = L_0 + (\frac{f_1 - f_0}{2f_1 - f_0 - f_2})C$

- L_0 = Lower class boundary of the modal class
- f_0 = Frequency of the class preceding the modal class
- f_1 = Frequency of the mode class
- f_2 = Frequency of the class succeeding the modal class
- C = Size of the modal class

6. $Qi = L_{qi} + \left(\frac{i*N/4 - F_{qi}}{f_{qi}}\right)Cqi$

- Q = Quartiles
- i = 1, 2, 3
- N = Number of items in the data set
- $L\,q_i$ = Lower class boundary of the Q_i^{th} class
- $F\,q_i$ = Cumulative frequency of the class preceding the Q_i^{th} class
- $f\,q_i$ = Frequency of the Q_i^{th} class
- $C\,q_i$ = Size of the Q_i^{th} class interval