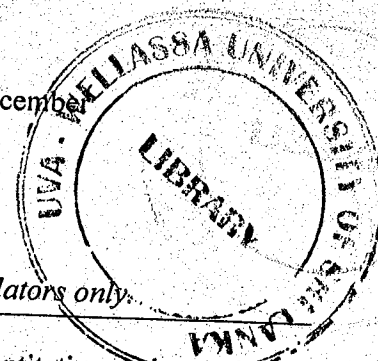


Uva Wellassa University
 First Year First Semester Examination- 2006 December
 STA 101-3 Quantitative Reasoning
 Time: Three (3.0) hours
 (Answer all questions)



Students are allowed to use not programmable calculators only.

- a) Classify each of the following variables as qualitative/ quantitative and quantitative variable as discrete/ continuous. What can you say about scale of measurements?
- Occupation of persons
 - Number of vehicles owned
 - Region of residence
 - Volume of tree
- b) State whether the following statements are True(T) or False(F)
- The Standard Deviation is never negative.
 - The average height in a class is also 60 inches. There are 30 people in a class. One can conclude that 15 of the students are less than 60 inches tall.
 - If two data sets have same average and same Standard Deviation, their histograms must be the same.
 - If the Standard Deviation of a list of numbers is zero, then its average must also be zero.
 - If 10 is added to each number in a list, then Inter Quartile Range is increased by 10.

(12 marks)

- a). What is the most suitable method of measurement in each of the following survey. You should state the method and clearly indicate the data collection procedure briefly.
- Collection information on the knowledge of English and IT among students in a given university.
 - Getting world opinion on a controversial issue, such as bowling action of an international cricketer.

b). Conducting of two sampling surveys led to the following conclusions. Critically comment on the following things.

i. In a sample survey to study whether there is any relationship between general knowledge and subject combinations of university students it was revealed that there is higher correlation between general knowledge and the performance of the Arts students than that of Science students.

ii. Clergy to have a higher life expectancy than that of the lay people (normal people).

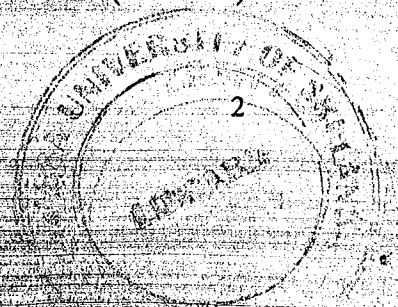
c). A Manager of a newspaper wishes to estimate the average number of newspapers purchased for a week per household by a community consisting of two villages. Each village consists of a number of lanes. A survey was conducted and the data set is given in the table below.

| Village | Lane | Number of Households | The number of news papers purchased for week by each household |
|---------|-------|----------------------|----------------------------------------------------------------|
| 1 | 1 | 15 | 2 4 7 1 4 7 3 3 2 2 6 3 1 4 5 |
| | 2 | 17 | 5 7 2 4 6 5 3 8 5 1 5 1 5 5 8 4 4 |
| | 3 | 13 | 8 4 7 7 6 3 8 5 8 0 7 5 7 |
| | 4 | 19 | 2 8 3 7 2 1 3 5 6 1 7 9 3 8 8 4 2 3 5 |
| | 5 | 20 | 5 3 2 6 9 8 2 8 0 6 4 5 9 9 6 4 6 5 7 3 |
| | Total | 84 | |
| 2 | 1 | 19 | 0 3 3 0 1 4 3 5 4 2 2 5 5 1 3 5 3 1 1 |
| | 2 | 21 | 3 1 0 4 0 1 1 5 3 4 4 2 1 4 3 2 4 2 1 3 4 |
| | 4 | 19 | 0 3 0 1 5 3 3 3 3 2 3 1 3 4 2 1 3 5 5 |
| | 5 | 22 | 3 2 2 2 4 1 2 5 1 3 3 2 0 3 2 2 2 3 3 1 1 3 |
| | 6 | 19 | 0 0 1 1 1 4 3 4 2 3 3 4 4 3 3 1 4 0 1 |
| | Total | 100 | |

i. The life styles of people living in different villages are different, but they are approximately the same within the village. What is the suitable sample method and clearly explain the way you would select sample of 50 householders.

ii. Estimate the average number of newspapers purchased per household in a week and compare with average number of newspapers purchased per household in a week by the community (without sampling). Comment your ideas critically.
(Random Number Table is given end of the paper)

(25 marks)



3. "The main objective of QR is to understand the truth underlying the precision of data and come to a conclusion scientifically". According to that explain the following situations.

a). Consider the following records of South Asian Games held in last year participating Sri Lanka, India, Pakistan and etc. (m-minutes, s-seconds)

| | <u>Event</u> | <u>Time</u> | <u>Winning Country</u> |
|-----|----------------|-------------|------------------------|
| I | 100m (men) | 10.35s | India |
| | 100mX4 (men) | 40.58s | India |
| II | 100m (women) | 11.88s | Sri Lanka |
| | 100mX4 (women) | 46.26s | Sri Lanka |
| III | 400m (men) | 45.67s | Sri Lanka |
| | 400mX4 (men) | 3m 09.66s | Sri Lanka |

- Comment the time taken for 400m(men) with 100mX4(men)
- What is the average time taken by a runner in above three relays? Compare those values with their individual timing. Comment on your conclusions.
(Assume that each runner in individual events ran for the relay too.)

b). Who take an umbrella to protect from rain, make frequently comment that "when taking the umbrella it is not going to rain!". Comment the truth above statement.

c). Following facts were discovered by a survey done on passengers using an elevator.

Mean weight = 50kg

Mode weight = 75kg

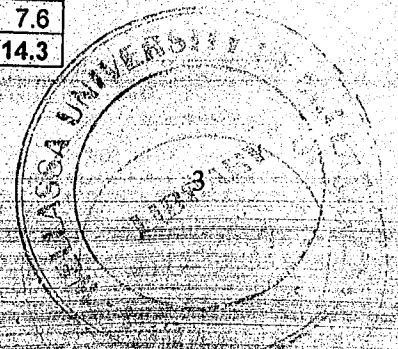
The maximum weight the elevator can carry per shift is 750kg, which is expressed in terms of maximum number of passengers.

Calculate and justify the maximum number of passengers, the elevator can carry per shift for a safe journey.

(15 marks)

4. The following data on tourist arrivals have been obtained from the annual reports of Ceylon Tourist Board.

| | | Tourist arrivals (in thousands) | | | | | |
|----------------------|----------|---------------------------------|-------|-------|-------|-------|-------|
| | | Year | 2001 | 2002 | 2003 | 2004 | 2005 |
| Reason for traveling | Pleasure | | 377.5 | 383.6 | 348.6 | 354.7 | 296.9 |
| | Business | | 21.3 | 10.8 | 10.5 | 15.6 | 9.8 |
| | Other | | 8.6 | 8.8 | 7 | 10.7 | 7.6 |
| | Total | | 407.4 | 403.2 | 366.1 | 381 | 314.3 |



Use a suitable graph or a chart to represent the above data. Comment on the variation of the tourist arrivals.

(08 marks)

5. a) Suppose that the following two data sets I and II correspond to percentage marks obtained by two groups of students of size twenty each. They are arranged in ascending order of magnitude.

| | | | | | | | | | | | | | | | | | | | | |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| I | 11 | 11 | 13 | 14 | 18 | 21 | 23 | 28 | 30 | 33 | 37 | 39 | 41 | 43 | 54 | 57 | 79 | 81 | 82 | 87 |
| II | 10 | 22 | 27 | 28 | 28 | 29 | 29 | 29 | 31 | 35 | 38 | 38 | 50 | 52 | 54 | 80 | 82 | 90 | 90 | 95 |

- i. Classify each of the above data sets according to the following table.

| Class Boundaries | Frequency I | Frequency II |
|------------------|-------------|--------------|
| E: (0.05- 29.5) | | |
| D: (29.5- 39.5) | | |
| C: (39.5- 54.5) | | |
| B: (54.5- 69.5) | | |
| A: (69.5- 99.5) | | |

- ii. Hence calculate the means using (i) raw data and (ii) classified data for each of the data sets. Compare the accuracies and comment critically on the assumption about data.
- iii. Find the cumulative frequencies for each group of students and draw their graphs on the same graph paper. Comment on the differences.
- b). Percentage marks for eighty course units offered by each of hundred students at the end of three years are stored in a computer. For each student (i) minimum, (ii) maximum and (iii) mean; percentage mark of the eighty course units have been obtained in a printout as in the table given below:

| | (i) minimum | (ii) maximum | (iii) mean |
|-----|-------------|--------------|------------|
| 1 | ... | ... | ... |
| 2 | ... | ... | ... |
| . | ... | ... | ... |
| . | ... | ... | ... |
| 99 | ... | ... | ... |
| 100 | ... | ... | ... |

Discuss the skewness of each of the data sets of (i) minimum, (ii) maximum and (iii) mean.

(25 marks)

- 6 a). Following table gives the response of 1000 drivers in different age groups (in years) the road accidents those drivers have encountered.

| Number of Accidents | Age Group(Yrs.) | | | | Total |
|---------------------|-----------------|-------|-------|-------|-------|
| | 18-22 | 23-30 | 31-40 | 41-70 | |
| 0 | 261 | 366 | 186 | 87 | 900 |
| 1 | 30 | 28 | 12 | 10 | 80 |
| 2 or more | 9 | 6 | 2 | 3 | 20 |
| Total | 300 | 400 | 200 | 100 | 1000 |

- i. Comment about the carefulness of the drivers in different age groups?
- b) Oral cancer patients from five(5) districts are residing at the Maharagama Cancer Hospital in a certain year. There are nine from Colombo district, one from Galle district, thirteen from Gampaha district, nine from Kalutara district and thirteen from Ratnapura district. Discuss critically the variation of cancer patients in these five districts. You may assume that the population size of Galle, Kalutara and Ratnapura districts are equal while the population size in Gampaha is one and half times and Colombo is twice as that of any of those three districts.

(15 marks)

Random Number Table

33865 04131 78302 22688 79034 01358 61724 98286 97086 21376 09356 09387
 52825 93134 21731 93956 85324 68767 49490 11449 98243 37636 64825 43091
 24906 13545 90172 31265 81457 93108 99052 61857 33938 86339 63531 77146
 33252 81388 28302 18960 00713 24413 36920 03841 48047 04207 50930 84723
 07400 81109 34819 80011 17751 03275 92511 70071 08183 72805 94618 46084

