Elementary statistics

Science, Statistics

Elementary Statistics – Exam Solutions CHAPTER 1. Qualitative data describes the meaning rather than giving statistical inferences. This gives an in depth analysis of the data and have more validity. For example, gender, religion or race.

Quantitative data on the other hand focus on numbers and are more statistically oriented rather than focusing on the meaning or experience. This type of data provides information that is generally easier to analyze and is fairly more reliable. Examples include: national identification numbers or social security numbers.

2.

(a) Interval

(b) Nominal

(c) Ordinal

(d) Ordinal

(e) Ratio

3.(a) Continuous

(b) Discrete

4.(i) FALSE

(ii) FALSE

(iii) TRUE

(iv) TRUE

(v) FALSE

5.(i) C) Systematic

(ii) E) Random

(iii) C) Convenience

CHAPTER 2

6.(a)

Pulse rate Frequency Relative Frequency

60-69 12 12/40 = 0. 3

70-79 14 14/40 = 0. 35

80-89 11 11/40 = 0. 275

90-99 1 1/40 = 0. 025

100-109 1 1/40 = 0. 025

110-119 0 0/40 = 0

120-129 1 1/40 = 0. 025

TOTAL 4040/40 = 1

(b)

7.

Daily Low

Temperatures (oF) Frequency Class widthClass midpoints Class boundaries

35-39 13734. 5-39. 5

40-44 34239. 5-44. 5

45-49 64744. 5-49. 5

50-54 125249. 5-54. 5

55-59 75754. 5-59. 5

60-64 86259. 5-64. 5

65-69 16764. 5-69. 5

CHAPTER 1

1.

Systematic sampling – this method of sampling is part of a random sampling

but in ascending or descending orders. If a population has 1, 000 units then in this case every 10th or 20th item is chosen.

Convenience sampling – the population in this method is specific to a certain research and conveniently provides the information required

Stratified sampling – the population in this case is divided into groups in a way in which the members of each group have similar characteristics. This is called stratification and the groups are referred to as strata. Random samples from each group are collected to form a sample.

Cluster sampling – this is closely related to stratified sampling in that; items are grouped according to their similar characteristics. However, the groups are not randomly chosen, there is an order in selecting the clusters.

Random sampling – in this method, each and every member of the population has an equal probability of being included in the sample. Selection is based entirely on chance and it is assumed that if this is the case it will be a sufficient representation of the whole population.

Ordinal data – items which are set in some form of order by their position on a scale.

Nominal data – these are items that are differentiated by a naming system

Discrete data – this is data which results from a finite variable and the values constitute a sequence of separated points that are real numbers.

Continuous data – this can take any real number value from a certain interval or range.

2.

High-school class rank – this is an example of ordinal data since the items are ranked in a certain order according to the high-school grades.

3. (A) Systematic

4. Relative Frequency – this refers to the absolute frequency of an event which is then normalized by the total number of the respective events.

5.

Age of

Actress Frequency Relative Frequency

21 - 30 28 28/76 = 0. 37

31 - 40 30 30/76 = 0. 38

41 - 50 12 12/76 = 0. 16

51 - 60 2 2/76 = 0. 03

61 - 70 2 2/76 = 0. 03

71 - 80 2 2/76 = 0. 03

TOTAL 761. 00

6.

7.

Mean – it is the average of a given set of data. The value attained by summing up all values and dividing by the total number of all values.

Median – this is the middle number when all values are arranged in ascending or descending order.

Mode – this is the most occurring value in a set of observations.

Range – this is the difference between the highest and the lowest values.

Standard deviation – this is how much each value deviates from the mean

Empirical rule – this rule states that for a normal distribution, almost all values usually lie 3 standard deviations of the mean

Chebyshev’s theorem – this theorem states that a proportion of data values

must be within a particular number of standard deviations from the mean. This theorem applies to any set of data regardless of the data distribution shape.

Standard Score – this is an indication of how many standard deviations an event or observation is below or above the mean.

8.

Mean = 7. 70 + 7. 30 + 6. 60 + 8. 40 + 6. 70 + 7. 60 + 6. 60 + 7. 10 + 7. 70 + 8. 40 + 6. 60 = 7. 34

11

Range = 8. 40 – 6. 60 = 1. 80

9.

(a) Sample mean = $300 + $262 + $330 + $440 + $233 + $119 + $329 + $254 = $283. 375

8

(b) Sample Standard Deviation

x

(x-mean)

300

276. 39

262

456. 89

330

2, 173. 89

440

24, 531. 39

233

2, 537. 64

119

27, 019. 14

329

2, 081. 64

254

862. 89

Total

59, 939. 87

Standard Deviation = √59, 939. 87/8 = 86. 56

10.

(a) 68% of values fall: mean +/- standard deviation. Therefore, 68% of women will have heights of between 154cm and 168cm

(b)95% of values fall: mean +/- 2 standard deviations. Therefore, 95% of women have heights of between 147cm and 175cm

11.

Chebyshev's theorem states that 75% of data values must be within 2 standard deviations of the mean. Therefore 75% of the heights of women will lie within 2 standard deviations of the mean.

Minimum height = Mean – 2 standard deviation = 161 – (2 * 7) = 147cm

Maximum height = Mean + 2 standard deviation = 161 + (2 * 7) = 175cm

12.

Event – this is a possible outcome of any experiment. It is also a result of an undertaken trial or observation.

Complement – this is the opposite of an event. It is the set of all possible outcomes of an experiment that have been excluded from an event.

Compound event – this is an event that incorporates two or even more independent events.

Mutually exclusive – events can be said to be mutually exclusive if the occurrence of one of the events prevents the other event or events from occurring.

Conditional probability – this is the probability that is associated with event combinations but some prior result has previously been attained with one of them.

Permutations rule – this refers to an order arrangement of items in which there must be strict observation of the order.

Combinations rule – refers to a group of items whose order is not important unlike in permutations.

13.

(a) Probability of an odd number = 18/38 = 0. 47

(b) Probability of non-odd number = 1 – 0. 47 = 0. 53

14.

(a)Probability of someone who told a lie = 20/100 = 0. 20

(b) Probability of polygraph indicating a lie = 32/100 = 0. 32

(c)Probability of someone who told truth or polygraph indicated the truth = 69/100 = 0. 69

15.

12!/6! = 12 * 11 * 10 * 9 * 8 * 7 * 6 * 5 * 4 * 3 * 2 * 1 = 665, 280

6 * 5 * 4 * 3 * 2 * 1

16.

C = n! = 12! = 924

r!(n-r)! 6!(12-6)!

Works Cited

Triola, Mario (2011) Elementary Statistics, 11th Edition. Pearson