

# Maths

[Science](#), [Mathematics](#)



Maths Assignment Number 3 Siobhan O'Connor Question Lo3 LO3. 2 a)

Histogram to show each distribution scaled such that the area of each rectangle represents frequency density and find the mode.

Data

Revenue

January

July

10

38

39

10 > 15

40

69

15 > 20

22

41

20 > 30

13

20

30 > 40

4

5

For January

Mode: 40 for 10 and less than 15

For July

Mode: 69 for 10 and less than 15

b) Produce a cumulative frequency curve for each of the distribution and find the median and interquartile range

Revenue

January

Cumulative Frequency

July

Cumulative Frequency

10

38

65

39

61

10 > 15

40

105

69

130

15 > 20

22

127

41

171

20 > 30

13

140

20

191

30 > 40

4

144

5

196

Median:  $(144/2) = 72 =$  Approximately 11.5

Interquartile Range:  $(3/4 * 144) - (1/4 * 144) = 108$  th and  $36$  th  $= 17 - 7 = 10$

Median:  $(196/2) = 98 =$  Approximately 13

Interquartile Range:  $(3/4 * 98 - 1/4 * 98) = 73.5$  th and  $24.5$  th  $= 12 - 7 =$

Approximately 5

c) For each distribution find the

i) Mean – The mean is the average of the numbers it is the sum divided by the count. The method we use to calculate the mean is to add up all the numbers then divide by how many numbers there are:

Revenue

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July

10

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39

10 > 15

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69

15 > 20

22

41

20 > 30

13

20

30 > 40

4

5

Mean

24

32. 66667

ii) Range – The range is the difference between the biggest and the smallest number

Using the class interval

Revenue

January

July

10

38

39

10 > 15

40

69

15 > 20

22

41

20 > 30

13

20

30 > 40

4

5

Mean

24

32.66667

Range

36

64

iii) The standard deviation – is used to quantify the amount of variation or dispersion of a set of data values

d) Discuss the relevance (the use) of the mean, median and mode for central tendency

Central Tendency refers to the middle value. The mean is the most commonly used for central tendency. The mean is valid for interval data or ratio data.

e) Discuss which of the following range, interquartile range and standard deviation gives the best basis for comparison for the distribution and why? Standard deviation gives the best basis for comparison because it can also be used to detect the skewness perspective.

f) Present and explain your conclusions about revenues in the two months  
The revenues in the two months fluctuated in an equal distribution. The highest revenue realised in both the instance is 10 and less than 15.

g) What further investigations would you suggest? In terms of collecting data.

I would suggest that the revenue data need to be collected on a daily basis . This is important because it ensure every data details is captured in their monthly information.

h) There are a number of alternative methods of processing data to calculate descriptive statistics; These include

Hand calculation

Advantage

In hand calculation, a person is more likely to use various methods to come up with a data due to its flexibility nature. The method is advantageous because a person can alter and change information anytime he or she feels that it needs to be corrected. Additionally, this form of method is always fast

and suits the needs of the user

The disadvantage of this method is that it is tedious and sometimes a person can get tired especially on long calculation. A person is more likely to get things wrong, this is because the evaluation is solely based on the person's ability and knowledge.

Pocket calculator with statistical functions

The advantages of using a pocket calculator include calculations being carried out faster. It also allows to successfully complete more difficult calculations. Using a pocket calculator can give you confidence when you are doing difficult problems and can help you focus on the problems, not the calculations.

Disadvantages:

A main disadvantage of using a pocket calculator may give you a false sense of confidence in your calculation abilities and might inhibit your ability to do even basic calculations in your head or on paper. You become reliant on electronic devices and there may be an instance where you need to work out a calculation by hand in the instance where you may not have a pocket calculator to hand.

Computer spreadsheet such as Excel

The formulae can be used to instantly recalculate totals. For example, if the builder changed his call-out charge, the total cost would be instantly recalculated taking the change into account. Using excel spreadsheets You can carry out " what if?" investigations. The information can be presented in different ways. For example, the grocer could produce a graph of fruit and vegetable sales by choosing the ranges A4: A10 and E4: E10 in order to



make the graph. It is easy to make changes using excel, save your work and print it out again. The presentation is flexible on excel, the column widths and easily delete or add columns and rows.

Underline, embolden text and use different fonts and graphics.

Justify your data to the left, centre or right.

Control the types of numbers you enter - for example you can choose percentage, currency or set the number of decimal places.

Specialist statistical packages (example: SPSS, MiniTab, S-Plus)

Identify advantages and disadvantages of each method

## SPSS

### Advantages

The software can take any given data from any given file and come up with a tabulated report. This is important because it gives a person a wider framework of analysis

### Disadvantage

The software is difficult to operate and at times is tedious to key in data. This is because it only provides a case to case data input.

## Mini\_Tab

### Advantage

The program makes it easy to find out the relationship between predictable variables and measurable responses. The software also specifies the polynomial terms and their interaction. The software also transforms the responses with the help of the Box-Cox transformations.

### Disadvantages

The software is difficult to operate and at times is tedious to key in data. This

is because it only provides a case to case data input.

S-Plus

Advantage

The software can allow the multiple statistical utilities and libraries that are easily available. The software also specifies the polynomial terms and their subsequent interactions.

Disadvantage

The software it is not as reliable and good compared to other statistical software that are in the market. Also the software have toolboxes that are not replaceable.

Lo3. 3 Question 2

a) How could the assumption that the bulb life is a normal distribution be tested?

Sample of data you could check the size of the data

e. g large data

Plot a histogram

Goodness of fit test

Hypothesis test you could test the distribution

b) If it is decided to replace all bulbs at once specified time, what interval must be allowed between replacements if not more than 10% of bulbs should fall before replacement?

You would refer to normal distribution table;  $.1 = 10\%$

10% probability

Corresponding z value  $-1.2 + 0.8$

$= -1.28$

c) What practical considerations might dictate such a replacement policy?

The average life of the bulb is dictated by the replacement policy. It would be cheaper to practically replace all the bulbs at once. There would need to be a permit to work, availability of manpower and available funding.

d) The supplier offers a new type of bulb, Type B that has a mean life of 450 days and the same standard deviation (60 days) as the present type. If these bulbs were to be used how would the replacement time be affected?

New type of bulb (Type B) is offered with average life = 450 days

Standard deviation = 60 days

$$Z = \frac{X - M}{\sigma}$$

$$\Sigma$$

$$-1.28 = \frac{X - 450}{60}$$

$$60$$

$$X = 373 \text{ days}$$

Since average life has increase to 450 days from previously 360 days it is normal that we could expect that the replacement time would increase.

e) Determine whether the new type of bulb is preferable given that it costs 25% more than the existing Type A. Present and explain your conclusions.

Type B bulb cost 25% more than Type A Bulb it is preferable:

Life has increased to 450 days

% increase in life span

$$\frac{450 - 253}{253} \times 100 = \frac{450 \text{ days} - 253}{253} \times 100$$

$$\frac{197}{253}$$

$$= \frac{197}{253} \times 100$$

$$77.8\%$$

Even though cost is 25% more life span increased by 30%. It would be worth picking Bulb B.

f) A rival supplier now offers a third type of bulb, Type C, that has a mean life of 432 days and a standard deviation of 45 days. If these bulbs were to be used how would the replacement time be affected?

Type C: 432 days

$M = 432$  days

$SD \Sigma = 45$  days

If these bulbs were to be used.

$X - M$

$\Sigma$

$-1.28 = x - 432$

145

$X = 374$  days

Previously it was 373 days. There is no significant change in the life span.

g) How should the Type C bulb compare for cost if it is adopted?

Present and explain your conclusions.