

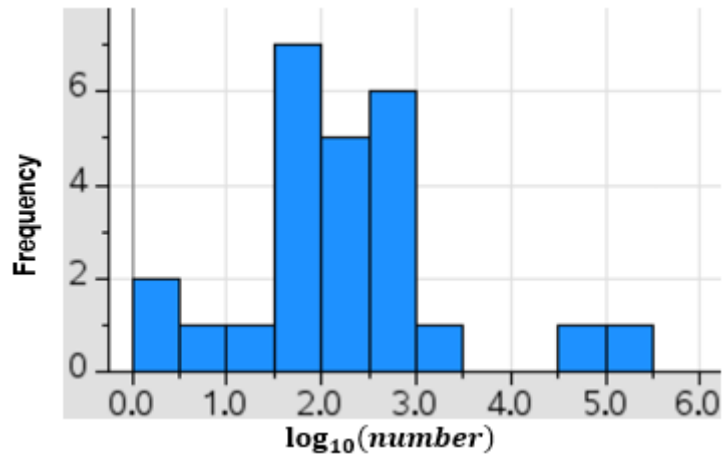
Univariate data Part 1

Each of the questions included here can be solved using either the TI-Nspire CX or CX CAS.

Scan the QR code or use the link:

Question: 1.

A survey was done of 25 randomly selected Instagram users, asking them about the number of Instagram followers they had. The results are displayed in the histogram below:



How many of the surveyed people had 3 or fewer followers?

- A. 6
- B. 22
- C. 2
- D. 23

Question: 2.

The least squares line predicts that the $\log_{10}(\text{area in hectares})$ of forest that will be used in order to produce toilet paper due to 2020 demand will be approximately 2.93. Correct to three significant figures, what is the expected area of forest that will be used for toilet paper making in 2020?



Question: 3.

A GP decided to collect data about the resting heart rates (in beats per minute) of his patients. After one day of seeing patients, he had the following results:

52	67	61	98	74
77	65	47	79	80
83	45	58	54	61
63	56	66	72	78

- a) Calculate the average heart rate and five-figure summary for the data collected.

After a few days of sampling, the list of heart rates is getting quite long. The GP decides that writing down numbers as a form of data collection is inefficient and messy. So instead, he records his data in a tally table. He collects one week's worth of data:

Heart rate intervals	Tally
40 -	
50 -	
60 -	
70 -	
80 -	
90 -	

- b) For this new data set, state the five-figure summary.

- c) Are there any outliers? Show your working.

Answers

Question 1

$$\log_{10} 3 = 0.477 \approx 0.5$$

So all values < 0.5 on this graph are required.

There are only 2 that are under 0.5, therefore 2 people have 3 or fewer followers.

A common error is to ignore the log scale and add the number of people below 3 on the axis provided which would yield the incorrect answer of B. 22.

Correct answer: C

Question 2

$$10^{2.93} = 851.138 \dots$$

851 correct to 3 significant figures.

Correct calculations involving logarithms often cause problems for students.

Also, many either forget to consider the number of significant figures needed for the answer, or do not know how to round answer to required number of significant figures. In these cases, changing the Float to the number of sig-figs could be useful. However, remember to change it back once the question is completed, or only change the settings within that particular document.

Question 3

a)

Statistic	Value
"Title"	"One-Variable Statistic"
" \bar{x} "	66.8
" Σx "	1336.
" Σx^2 "	92642.
" $s_x := s_{n-1}x$ "	13.3716
" $\sigma_x := \sigma_n x$ "	13.033
"n"	20.
"MinX"	45.

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" $\sigma_x := \sigma_n x$ "	13.033
"n"	20.
"MinX"	45.
"Q ₁ X"	57.
"MedianX"	65.5
"Q ₃ X"	77.5
"MaxX"	98.
" $SSX := \Sigma(x-\bar{x})^2$ "	3397.2

Average HR value: 66.8

Five-figure summary:

Min: 45

Q1: 57

Median: 65.5

Q3: 77.5

Max: 98

b)

"Title"	"One-Variable Statistics"
" \bar{x} "	66.5436
" ΣX "	9915.
" ΣX^2 "	678525.
" $s_X := s_{n-1}X$ "	11.2541
" $\sigma_X := \sigma_n X$ "	11.2163
"n"	149.
"MinX"	45.
"Q ₁ X"	55.
"MedianX"	65.
"Q ₃ X"	75.
"MaxX"	95.

Another approach using variables stored under "var":



Five figure summary

Minimum: **stat.MinX** ▶ 45.

Q1: **stat.Q₁X** ▶ 55.

Median: **stat.MedianX** ▶ 65.

Q3: **stat.Q₃X** ▶ 75.

Maximum: **stat.MaxX** ▶ 95.

You can tidy up the notes page by changing the maths box attributes to "Hide input":



Five figure summary

Minimum: 45.

Q1: 55.

Median: 65.

Q3: 75.

Maximum: 95.

c)



The calculator screen shows the following text:

Outlier test

IQR: $\text{stat.Q}_3X - \text{stat.Q}_1X \triangleright 20.$

Lower fence: $\text{stat.Q}_1X - \text{iqr} \cdot 1.5 \triangleright 25.$

Data min: $\text{stat.Min}X \triangleright 45.$

Upper fence: $\text{stat.Q}_3X + 1.5 \cdot \text{iqr} \triangleright 105.$

Data max: $\text{stat.Max}X \triangleright 95.$

You can tidy up the notes page by changing the maths box attributes to “Hide input”:



The calculator screen shows the following text:

Outlier test

IQR: 20.

Lower fence: 25. Data min: 45.

Upper fence: 105. Data max: 95.

As the data is all between the lower and upper fences, no outliers exist.