

Please note that the suggested written answer is not a definitive response but is meant as a guide only.

Exemplar 1

Question: Provide a summary of the hours that students are working per week.

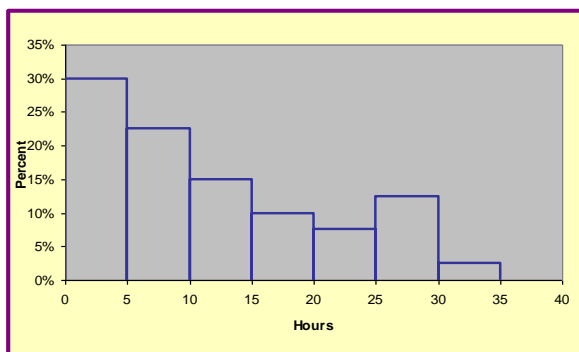
Analysis of Survey of university students

Variable: Hours that students are working per week

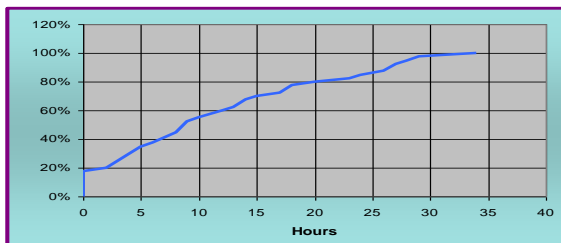
Frequency Table

Hours	Count	Percent
0.0 to < 5.0	12	30.0%
5.0 to < 10.0	9	22.5%
10.0 to < 15.0	6	15.0%
15.0 to < 20.0	4	10.0%
20.0 to < 25.0	3	7.5%
25.0 to < 30.0	5	12.5%
30.0 to 35.0	1	2.5%
Total	40	100.0%

Histogram

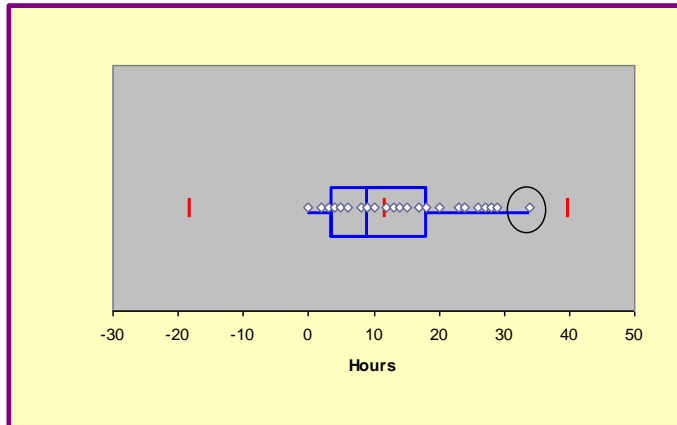


Ogive



$Q_1: i = \frac{25}{100} \times 40 = 10, \quad Q_1 = \frac{3+4}{2} = 3.5$
$Q_3: i = \frac{75}{100} \times 40 = 30, \quad Q_3 = \frac{18+18}{2} = 18$

$$\text{IQR} = 18 - 3.5 = 14.5$$



Report

- Based on a sample of 40 students, approx 50% work less than 10 hours, 25% work between 10 and 20 hours and 25% work for more than 20 hours.
- There appears to be two groups in the data. One centred around 0 – 5 hours and a smaller group centred around 25 – 30 hours. This may indicate some students are working casually and some are permanent part time.
- Finally, 82.5% of students do some form of paid work.
- The 40 students surveyed worked between 0 and 34 hours with an average (median) of 9 hours.
- 18.5% of students in the survey did no paid work; 25% of students do no more than 3.5 hours a week; and 25% of students work at least 18 hours a week.
- There was quite a bit of variation in hours worked amongst those students surveyed. The 'middle' 50% of students were spread over a range of 14.5 hours (or almost two full days worked).
- There was an unusual amount of hours (34) worked by a student that would require further investigation.

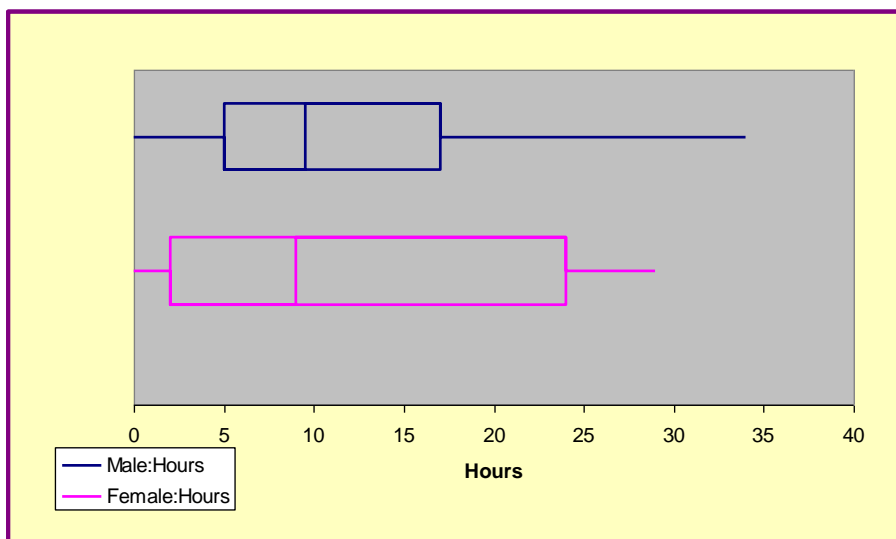
Exemplar 2

Question: Are the number of hours worked different for male and female students?

Analysis of Survey of university students - Hours that students are working per week

Variables: Gender and Hours that students are working per week

	Female:Hours	Male:Hours	
Number of Data Points	18	22	
Minimum	0	0	
Maximum	29	34	
Total	214	250	
Arithmetic mean	11.889	11.364	
Median	9.0	9.5	avg.
Mode	.0	.0	
First Quartile	2.0	5.0	loc.
Third Quartile	24.0	17.0	
Range	29	34	
Inter Quartile Range	22.0	12.0	spread
Variance (Sample)	119.399	80.528	
Standard Deviation (Sample)	10.927	8.974	
Coefficient of Variation (Sample)	0.919	0.79	
Skewness Coeff (Pearson's, Sample)	0.793	0.623	shape



Report

- Males and females work on average approximately the same number of hours per week at 9 hours.
- However, hours worked by females is more varied than that of males.
- The middle 50% of female students varies b/w 2 and 24 hours compared to 5 to 17 hours for the middle 50% of males.

- Gender does seem to affect the number of hours worked and so the variables are related: “hours dependent on gender”.

Exemplar 3

Question: Can you please provide more background to job satisfaction?

Analysis

Variable and info: Job satisfaction. Rating from 0 to 20 (lowest to highest satisfaction).

How satisfied are you with your job at XYZ? Give a rating from 0 (Completely dissatisfied) to 20 (Totally satisfied).



Report

We noted the range of job satisfaction values from 8 to 18, and the clustering around 11 to 15. The most common value may well be 17; however, it is not representative of the data as there have been 9 responses of 17: in fact 9 out of 48 in the sample. We will have to investigate why. There could be a perfectly logical reason: perhaps they all work together? At the other extreme, there were four respondents with job satisfaction scores of only 8 and 9. On our analysis they certainly seem to stand apart from the rest of the data. Our immediate thought is that they are outliers, but there are four of them. Had there been just one, or two, we would be more suspicious of a possible error when entering the data into the computer. We will look at these four employees in more detail too: perhaps they all work together?

Exemplar 4

Question: Can you please provide me with a summary of productivity?

Data Analysis:

Variable and background: Productivity %

A measure of productivity performance with 100% as the base. (What was your productivity rating for the year ended June 30? _____ %)

Productivity performance measures would be implemented for all employees, with objectives set for each individual at the beginning of the financial year. Performance would be measured at the end of each year. Productivity would be measured as the percentage of objectives completed. The aim of the company is to average a 100% productivity performance, or better.

Productivity

Mean	98.86042
Standard Error	0.634909
Median	98
Mode	98
Standard Deviation	4.398778
Sample Variance	19.34925
Kurtosis	-0.97478
Skewness	0.22148
Range	15.8
Minimum	91.2
Maximum	107
Sum	4745.3
Count	48
Q1	95.4
Q3	102.6
IQR	7.2
90 th Percentile	105.1

Report

The productivity of the 48 employees surveyed ranged from between 91.2% to 107%. The lowest performing ¼ of staff are about 5 - 9% (i.e. percentage points) below the target of 100% (from 91.2% to 95.4%). The best performing 10% of staff are about 5 - 7% above expectations (from 105.1% to 107%). The average (mean) performance was about 98.9%. However, there was quite a bit of variation in the productivity performance of the employees who were surveyed. The difference from the worst to the best employee was almost 16%. Furthermore, there was a 4.4% average spread away from the mean productivity of 98.9%. While there were extreme performances at both the bottom and top end of those surveyed, they were not so distant from the rest of the data that they could be considered to be highly unusual results.

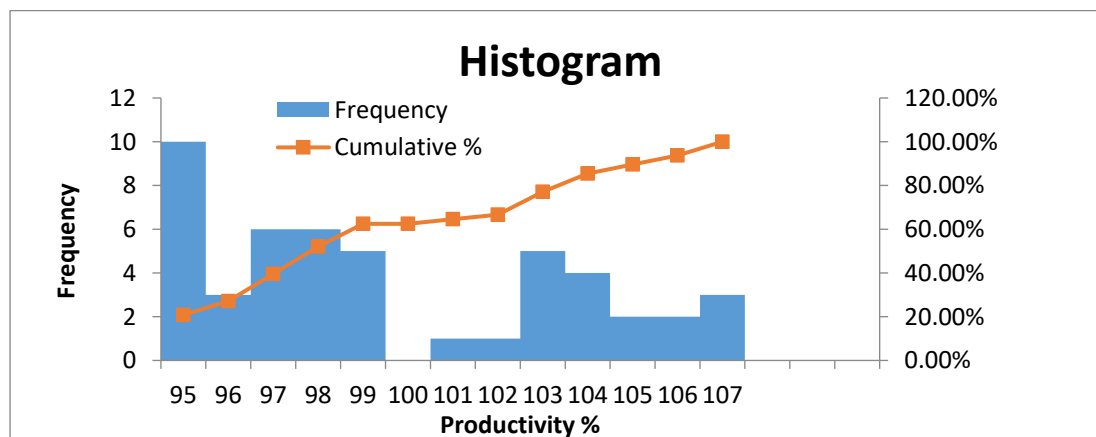
Exemplar 5

Question: You said you wanted to investigate the Productivity results further. A range of 91.2% to 107.0% is more than I would have expected. But then an average of 98.86% is not far from our objective of 100% on average per employee. Can you provide more background please to productivity?

Data Analysis:

Variable: Productivity % - A measure of productivity performance with 100% as the base.

Productivity Level	Frequency	Cumulative %
95	10	20.83%
96	3	27.08%
97	6	39.58%
98	6	52.08%
99	5	62.50%
100	0	62.50%
101	1	64.58%
102	1	66.67%
103	5	77.08%
104	4	85.42%
105	2	89.58%
106	2	93.75%
107	3	100.00%



Report

There appear to be two distinct clusters of employees: those who are performing above 100% (and well above in some instances) and those performing below 100% (and well below in some instances). Further, the bulk of the employees are not achieving the 100% objective. In fact 62.5% of the 48 employees surveyed failed to achieve the 100% objective or better. The typical performance is around the 98–99% mark. We are going to have to look at this variable in far more detail. We are mystified by the two clusters. Such patterns are not commonly found in data, but if they occur they must be investigated. Probably like you, we expected a single peak with an even distribution either side, and not such a large degree of spread.

Exemplar 6

Question: Your earlier report on productivity has me intrigued and bewildered. I am particularly concerned about the failure to meet both the productivity target of 100% or more per employee and the days absent target of 1.5 days or less per employee. (It is possible that some employees are exploiting the system and taking their maximum of 5 days.)

I would like you to start with some obvious groups in looking at both productivity and days absent.

Data Analysis

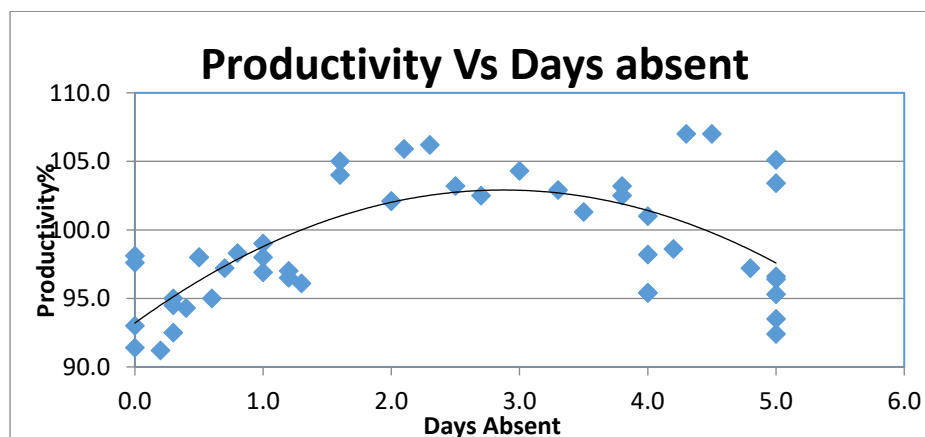
Variables:

Productivity %: A measure of productivity performance with 100% as the base. (What was your productivity rating for the year ended June 30? _____ %)

Days absent: Days absent as taken as personal leave. Maximum of 5 days allowed.

As well as normal leave entitlements (recreation, sick and long service leave), a concept called personal leave was introduced. Under this agreement, all employees are entitled to up to five days leave, 'no questions asked'. Leave taken in this manner is meant to be used for situations such as minor sickness, emergencies, etc. The company has introduced this entitlement as a goodwill gesture to employees, and aims to average 1.5 days a year per employee, or less. Any leave taken over 5 days must be fully accounted for.

(What was your number of days absent on personal leave for the same period? _____ days)



Report

Analysis shows a number of employees are taking 2 days or less a year, while there is a significant proportion taking 4 or more. In fact the data show that of the 48 employees in the sample, 7 took 5 days personal leave. Further, 9 of the 48 respondents took 4.5 days or more. The polarisation of results is quite clear from the analysis. Does this mean that the number of staff taking a minimum number of personal leave is counterbalanced by a roughly equal proportion of staff exploiting the system, as you suggested? Are those taking the excessive leave those who are failing to achieve the productivity target? While we may be tempted to draw such conclusions on the face value of these results, we will have to look at the survey results in greater depth.