

Summary Measures

Exercise 6.1 & 6.2

Measure	Diet A	Diet B
Sample Size (n)	50	50
Mean Weight Loss	5.341 kg	3.710 kg
Standard Deviation	2.536 kg	2.769 kg
Median Weight Loss	5.642 kg	3.745 kg
IQR	3.285 kg	3.812 kg

Interpretation:

Diet A is more effective: Both the mean and median weight loss are higher for Diet A, suggesting stronger overall performance.

Less variability in Diet A: The standard deviation for Diet A is slightly lower, meaning more consistent results.

IQR is similar: While Diet B has a slightly wider IQR, the central tendency (median) Favors Diet A.

Conclusion: On average, individuals lost more weight and had more consistent results with Diet A compared to Diet B.

Exercise 6.3

Brand A more preferred in Area 2 (21.1%) than in Area 1 (15.7%).

Brand B shows higher popularity in Area 2 (33.3%) than Area 1 (24.3%).

Preference for "Other" brands is higher in Area 1 (60%) compared to Area 2 (45.6%).

Conclusion: Area 2 exhibits stronger preferences for known brands (A and B), while Area 1 shows a greater inclination toward other alternatives — indicating potential demographic or market strategy differences.

Hypothesis Testing Worksheet

Hypothesis Testing Using Excel (see below for LibreOffice)

Exercise 7.1

The mean number of items sold was significantly higher for Container Design 1 than Design 2.

The difference (13.2 items) is statistically significant at the 5% level ($p = 0.0183$).

Conclusion: Design 1 led to more sales and is likely the better option.

The INDEPENDENT Samples T Test

Exercise 7.2

Diet A leads to significantly more weight loss than Diet B.

The difference (1.631 kg) is statistically significant ($p = 0.0028$).

Conclusion: There is strong evidence to prefer Diet A for greater average weight loss.

Hypothesis Testing Using LibreOffice

Exercise 7.3

21.1% preferred Brand A

33.3% preferred Brand B

45.6% preferred Other brands

Interpretation:

Compared to Area 1 (from the worksheet), where 60% chose "Other", Area 2 has:

Higher preference for Brand B

Lower reliance on "Other" brands

This suggests demographic differences in brand choices — potentially useful for targeted marketing.

The One-Tailed Test

Exercise 7.4

Filter Agent 1 (mean = 5.341) is significantly more effective than Filter Agent 2 (mean = 3.710).

The result is statistically significant at the 5% level ($p = 0.0014$).

Conclusion: We have strong evidence to conclude that Filter Agent 1 is more effective.

The INDEPENDENT Samples T Test

Exercise 7.5

Male income is significantly higher than female income.

The test is statistically significant ($p = 0.0014$), with a mean difference of 1.631 units.

Conclusion: There is strong evidence to support the claim that males have a higher mean income than females in this dataset.

Inference Worksheet

Step 1: State the Hypotheses

Null Hypothesis (H_0): $\mu = 3$ (children watch 3 hours of TV daily)

Alternative Hypothesis (H_1): $\mu \neq 3$ (children watch a different amount)

This is a two-tailed test.

Step 2: Set the Criteria for a Decision

Significance Level (α) = 0.05

Critical Z-value for two-tailed test at 0.05 = ± 1.96
(Using standard normal distribution)

Step 3: Compute the Test Statistic

We use the Z-test formula (population standard deviation is known):

$$Z = \frac{\bar{X} - \mu}{\sigma / \sqrt{n}} = \frac{4 - 3}{1.5 / \sqrt{36}} = \frac{1}{0.25} = 4.0$$

Step 4: Make a Decision

Calculated Z = 4.0

Critical Z = ± 1.96

Since $4.0 > 1.96$, we are in the rejection region.
p-value is much less than 0.05 \rightarrow significant

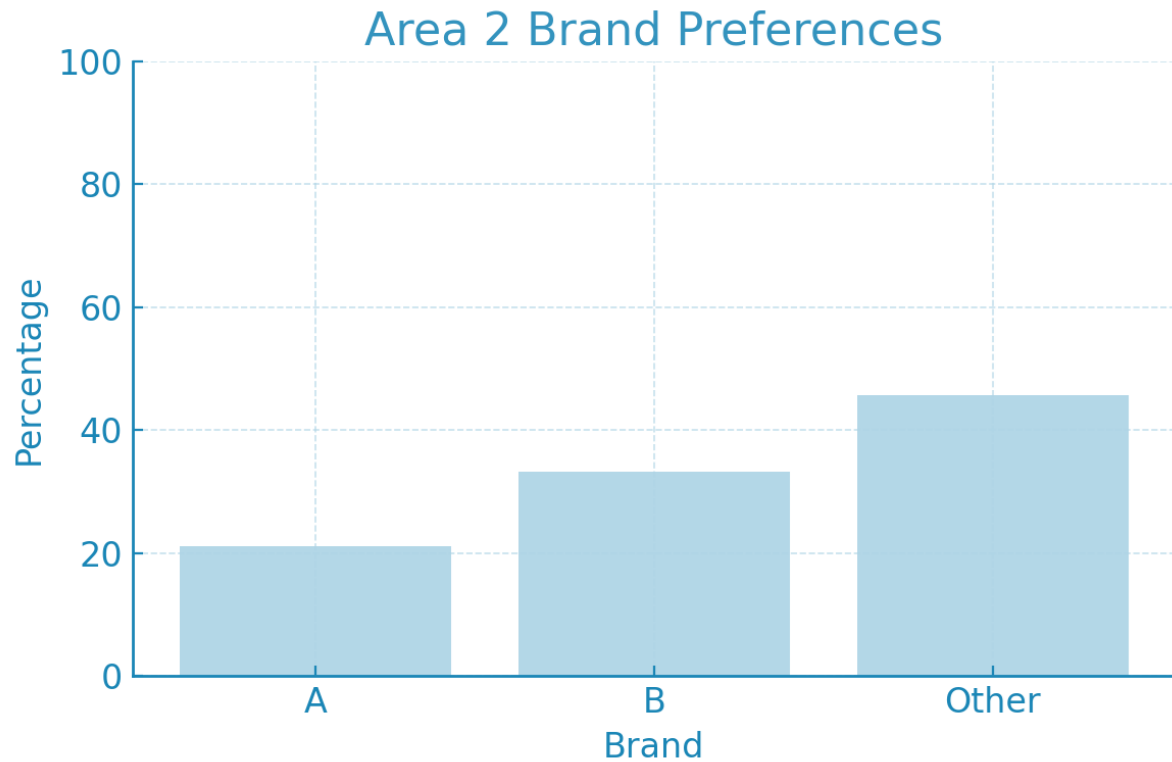
Final Conclusion:

Since the Z-value (4.0) lies beyond the critical region and the p-value < 0.05 , we reject the null hypothesis.

Conclusion: There is strong evidence that children watch more or less than 3 hours of TV daily (in this case, more).

Charts Worksheet

Exercise 9.1 Bar Charts in Excel (see below for LibreOffice)



Interpretation:

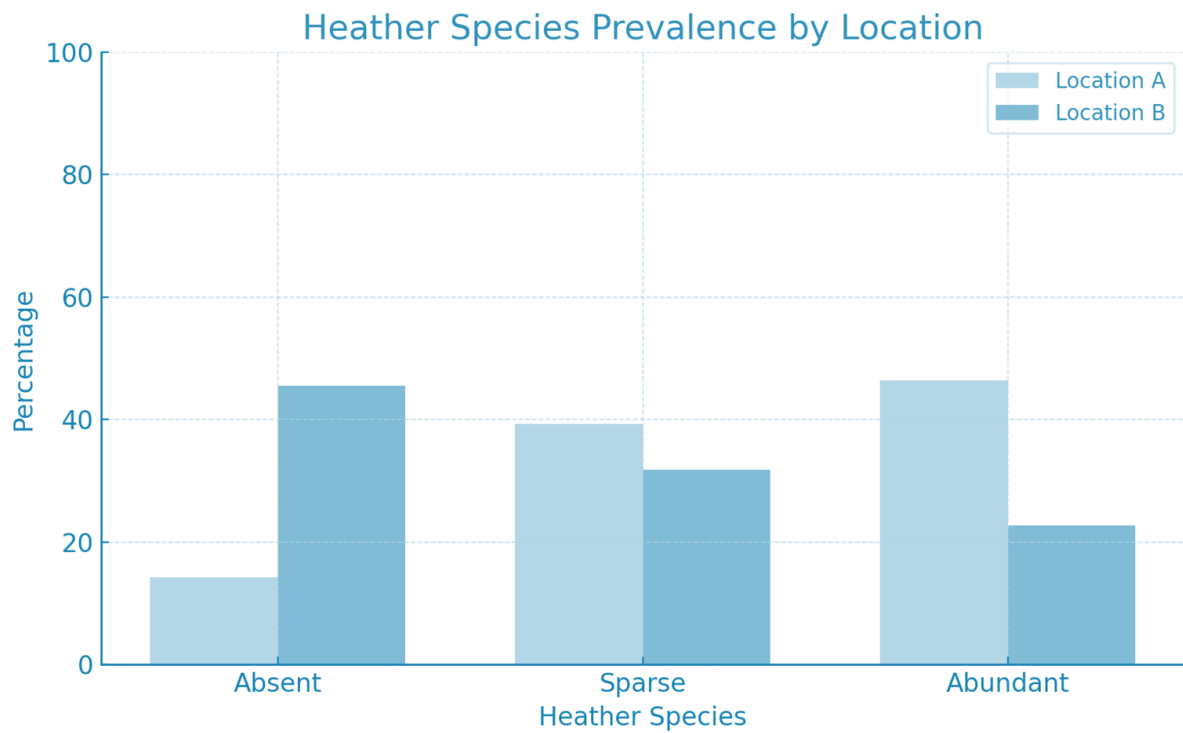
Brand A: 21.1%

Brand B: 33.3%

Other: 45.6%

Compared to Area 1 (where 60% preferred "Other"), Area 2 shows higher preference for named brands, especially Brand B.

Exercise 9.2



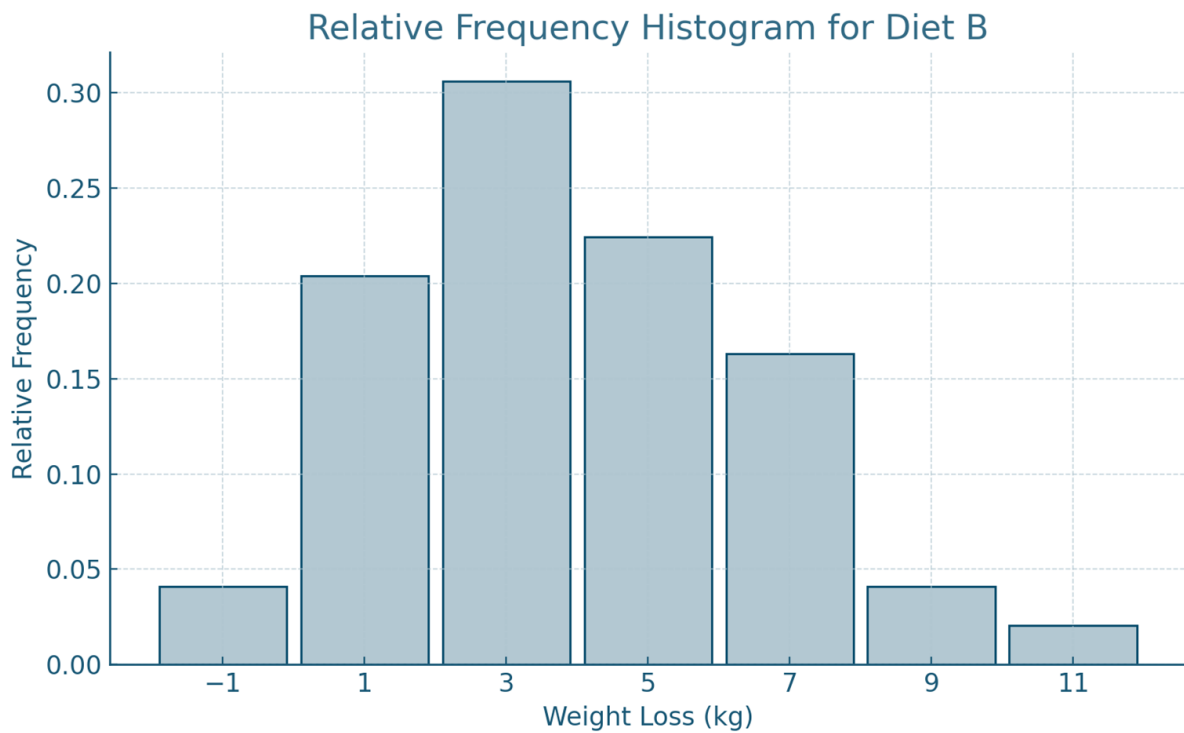
Interpretation:

Location A has more Abundant and Sparse growth compared to Location B.

Location B has a much higher percentage of Absent species (45.5% vs 14.3%).

Conclusion: Location A supports richer heather species growth, while Location B shows limited vegetation.

Exercise 9.3 Histograms



Interpretation:

The distribution is unimodal and slightly positively skewed (tail to the right).

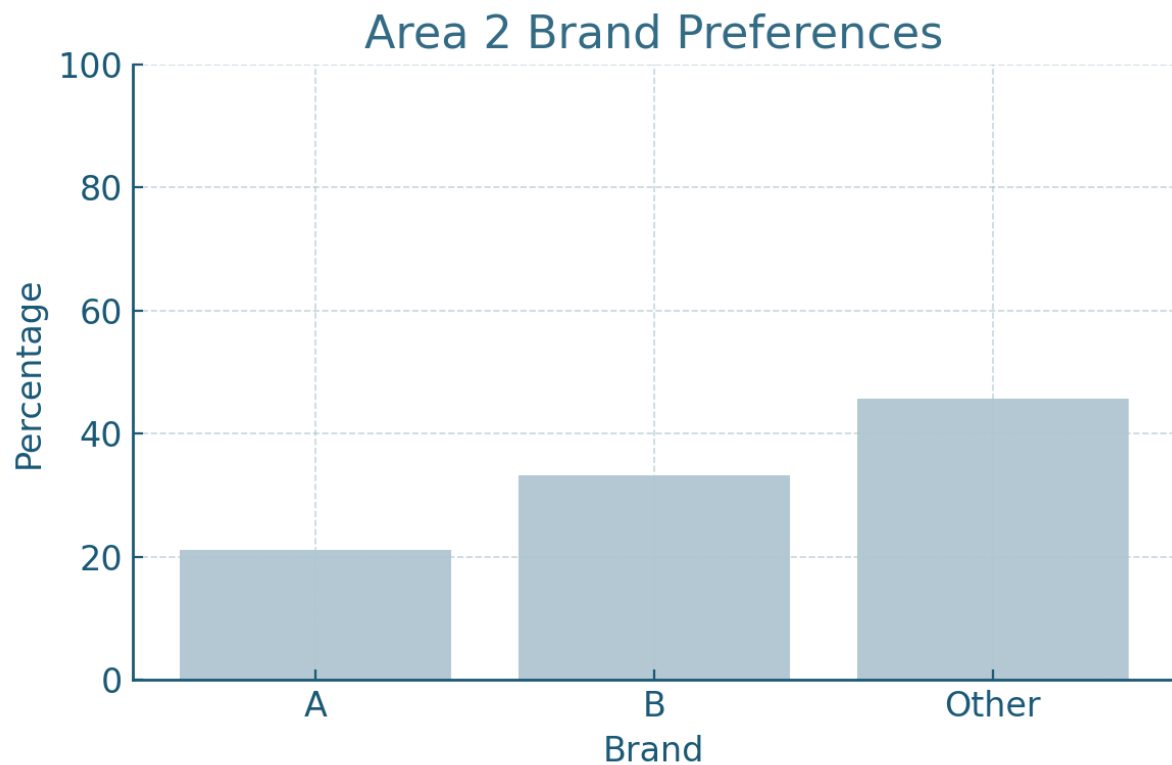
Most individuals lost between 2 to 8 kg, but fewer achieved very high weight loss.

Comparison with Diet A:

Diet A had a more symmetrical and consistent weight loss distribution.

Diet B shows less uniformity and lower frequency of high weight loss, suggesting it may be less effective overall.

Exercise 9.4 Bar Charts in LibreOffice



Interpretation:

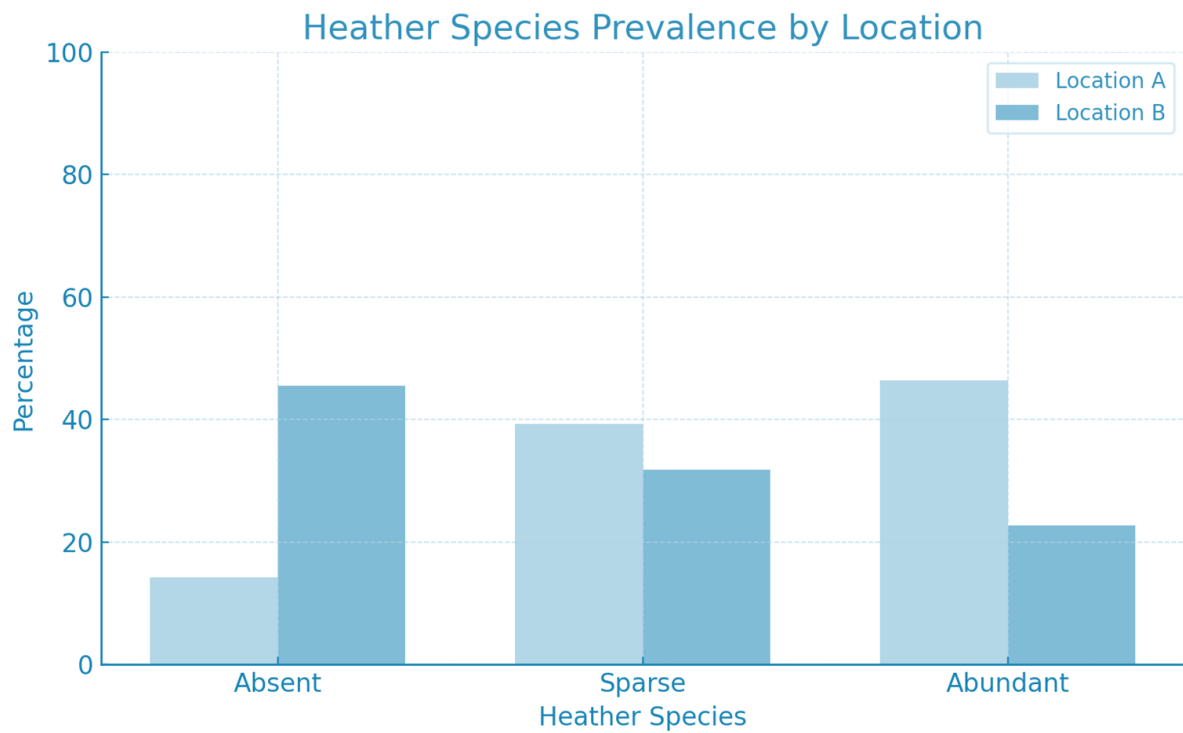
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Exercise 9.5



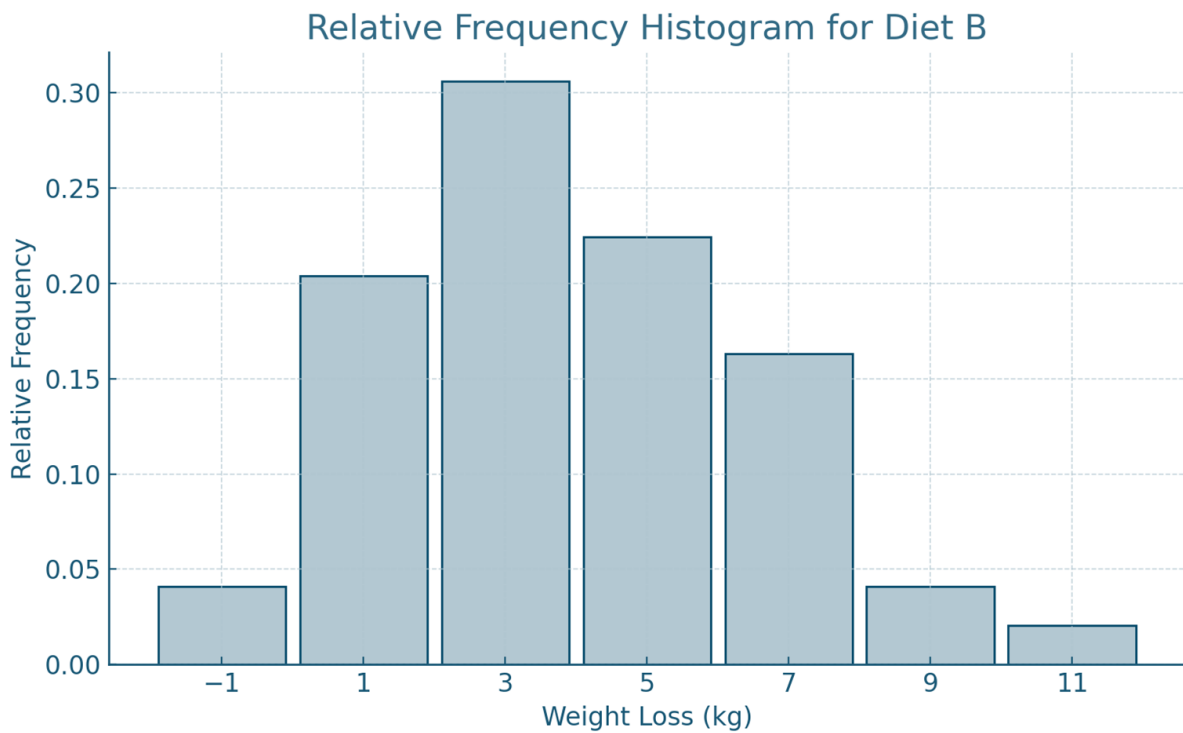
Interpretation:

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Exercise 9.6 Histogram



Interpretation:

The distribution is unimodal and slightly positively skewed (tail to the right).

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