Exercise 8.1

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Briefly interpret your findings. What do these results tell you about the relative effectiveness of the two weight-reducing diets?

Diet A is more effective in reducing weight on average and less dispersed than Diet B because Diet A has a higher average weight loss (5.341 kg) compared to Diet B (3.710 kg). in addition, Diet A has a lower standard deviation compared to Diet B.

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Exercise 8.2

Briefly interpret your findings. What do these results tell you about the relative effectiveness of the two weight-reducing diets?

Diet A is more effective in reducing weight on median and less dispersed than Diet B, because Diet A has a higher sample median weight loss (5.642 kg) compared to Diet B (3.745 kg). as well as IQR for Died A is lower than Diet B.

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Exercise 8.3

Briefly interpret your findings. What do these results tell you about the patterns of brand preferences for each of the two demographic areas?

The majority of respondents in Area 1 (60%) preferred some other brand of breakfast cereal and the remain (40%) divided between Brand A and Brand B. Which is not the case in Area 2, where (45.6%) preferred some other brand of breakfast which is less.

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Exercise 8.4

Consider the filtration data of Data Set G. Open the Excel workbook **Exe8.4G.xlsx** which contains these data from the Exercises folder.

Assuming the data to be suitably distributed, complete a two-tailed test of whether the population mean impurity differs between the two filtration agents, and interpret your findings.

The p-value is p = 0.008 which is less than 0.05 (5%). Therefore, we can reject the null hypothesis and there is a significant difference in the mean impurity levels between the two filtration agents. The obtained related samples t = -0.433, this means Agent1 has a lower mean impurity level than Agent2.

t-Test: Paired Two Sample for Means

| | *Agent1* | *Agent2* |
|---|---|---|
| Mean | 8.25 | 8.683333333 |
| Variance | 1.059090909 | 1.077878788 |
| Observations | 12 | 12 |

| | |
|---|---|
| Pearson Correlation | 0.901055812 |
| Hypothesized Mean Difference | 0 |
| df | 11 |
| t Stat | -3.263938591 |
| P(T<=t) one-tail | 0.003772997 |
| t Critical one-tail | 1.795884819 |
| P(T<=t) two-tail | 0.007545995 |
| t Critical two-tail | 2.20098516 |

| | |
|---|---|
| Difference in Means | -0.433333333 |

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Exercise 8.5

Recall that in Exercise 8.4, a two-tailed test was undertaken of whether the population mean impurity differs between the two filtration agents in Data Set G.

Suppose instead a one-tailed test had been conducted to determine whether Filter Agent 1 was the more effective. What would your conclusions have been?

The obtained related samples t = -3.264 and the associated one-tailed p-value is p = 0.004 which is less than 0.01 (1%). The data therefore constitute strong evidence (on a one-tailed test) that Agent1 has a lower mean impurity level than Agent2. The results continue to suggest that Filter Agent 1 is the more effective.

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Exercise 8.6

Consider the bank cardholder data of Data Set C. Open the Excel workbook **Exe8.6C.xlsx** which contains this data from the Exercises folder.

Assuming the data to be suitably distributed, complete an appropriate test of whether the population mean income for males exceeds that of females and interpret your findings. What assumptions underpin the validity of your analysis, and how could you validate them?

The observed F test statistic is F = 1.226 with 59 and 59 associated degrees of freedom, giving a two tailed p-value of p = 0.4365NS. The observed F ratio is thus significant. The data are consistent with the assumption that the population variances underlying the mean income for males and females differ, and we therefore proceed to use the unequal variances form of the unrelated samples t test.

Independent two-sample t-test is suitable when comparing the means of two independent groups. The obtained independent samples t = 3.268 with 117 degrees of freedom. The associated two-tailed p-value is p = 0.0014, so the observed t is significant at the 1% level (two-tailed). The sample mean income for males and females, respectively, 52.913 and 44.233. The data therefore constitute strong evidence that the underlying mean income for males exceeds that of females.

F-Test Two-Sample for Variances

| | *Variable 1* | *Variable 2* |
|---|---|---|
| Mean | 52.91333333 | 44.23333333 |

| | | |
|---|---|---|
| Variance | 233.1289718 | 190.1758192 |
| Observations | 60 | 60 |
| df | 59 | 59 |
| F | 1.225860221 | |
| P(F<=f) one-tail | 0.21824624 | |
| F Critical one-tail | 1.539956607 | |

| | |
|---|---|
| p2 | 0.43649248 |

t-Test: Two-Sample Assuming Unequal Variances

| | *Variable 1* | *Variable 2* |
|---|---|---|
| Mean | 52.91333333 | 44.23333333 |
| Variance | 233.1289718 | 190.1758192 |
| Observations | 60 | 60 |
| Hypothesized Mean Difference | 0 | |
| df | 117 | |
| t Stat | 3.267900001 | |
| P(T<=t) one-tail | 0.000711286 | |
| t Critical one-tail | 1.657981659 | |
| P(T<=t) two-tail | 0.001422572 | |
| t Critical two-tail | 1.980447599 | |

| | |
|---|---|
| Difference in Means | 8.68 |