Chapter 5 – Analysis of Differences

**Exercise 1**

The data below shows students’ scores before and after an intervention in a school class.

1. Explain what type of analysis is appropriate for this data set to determine whether or not there is a significant difference between the students’ scores before and after the intervention class.
2. State the null and alternative hypotheses.
3. Enter the data in Jamovi (Student Grades.csv file), editing the variable name, description, and data type properly.

|  |  |  |
| --- | --- | --- |
| Student | Before Intervention | After Intervention |
| 1 | 18 | 22 |
| 2 | 21 | 25 |
| 3 | 16 | 17 |
| 4 | 22 | 24 |
| 5 | 19 | 16 |
| 6 | 24 | 29 |
| 7 | 17 | 20 |
| 8 | 21 | 23 |
| 9 | 23 | 19 |
| 10 | 18 | 20 |
| 11 | 14 | 15 |
| 12 | 16 | 15 |
| 13 | 16 | 18 |
| 14 | 19 | 26 |
| 15 | 18 | 18 |
| 16 | 20 | 24 |
| 17 | 12 | 18 |
| 18 | 22 | 25 |
| 19 | 15 | 19 |
| 20 | 17 | 16 |

1. Perform the appropriate analysis and interpret the results according to the formed hypothesis. Assume uncertainty about the direction of outcome (two-tailed test).

**Exercise 2**

 A study assessed the effectiveness of a teacher feedback technique designed to reduce antisocial behavior in emotionally disturbed children playing korfball. A total of 8 children are enrolled in the study and the number of incidents of illicit or aggressive behavior during a week's sessions are measured both before the introduction of the feedback method and then again for a week afterwards. The data are shown below (you will also find this in the Feedback Technique.csv file).

|  |  |  |
| --- | --- | --- |
| **Child** | **Before Technique** | **One Week of Technique** |
| 1 | 85 | 75 |
| 2 | 70 | 50 |
| 3 | 40 | 50 |
| 4 | 65 | 40 |
| 5 | 80 | 20 |
| 6 | 75 | 65 |
| 7 | 55 | 40 |
| 8 | 20 | 25 |

1. Given this small dataset, explain what is the appropriate test to see if there is a significant difference between the median of two groups.
2. State the null and alternative hypotheses.
3. Enter the data in Jamovi. Make sure to edit the variable name, description, and data type.
4. Perform the appropriate analysis and interpret the results according to the formed hypothesis.

**Exercise 3**

A teacher of English as a Foreign Language attempts to improve grammar levels in a group of 'false beginners'. Two sets of revision classes were performed. The scores were recorded as below.

|  |  |  |  |
| --- | --- | --- | --- |
|  Adult | Before Intervention | After First Revision Class | After Second Revision Class |
| 1 | 18 | 22 | 20 |
| 2 | 21 | 25 | 22 |
| 3 | 16 | 17 | 20 |
| 4 | 22 | 24 | 26 |
| 5 | 19 | 16 | 15 |
| 6 | 24 | 29 | 30 |
| 7 | 17 | 20 | 25 |
| 8 | 21 | 23 | 26 |
| 9 | 23 | 19 | 25 |
| 10 | 18 | 20 | 23 |
| 11 | 14 | 15 | 20 |
| 12 | 16 | 15 | 14 |
| 13 | 16 | 18 | 22 |
| 14 | 19 | 26 | 24 |
| 15 | 18 | 18 | 19 |
| 16 | 20 | 24 | 23 |
| 17 | 12 | 18 | 25 |
| 18 | 22 | 25 | 27 |
| 19 | 15 | 19 | 22 |
| 20 | 17 | 16 | 20 |

1. Explain why administering multiple t-tests would not be beneficial for this scenario. Which test is appropriate?
2. State the null and alternative hypotheses.
3. Load EFL Grammar.csv into JASP (unlike Jamovi, JASP has no data editing tool).
4. Perform the appropriate analysis and interpret the results related to the hypothesis.

**Exercise 4**

Suppose that you want to compare the scores of participants from two *different* classes of 'false beginners', where the first class was subjected to a traditional teaching method, whereas the second was an experimental class, applying a different teaching style. Do note that each separate group needs to be represented by a number (here, within the 'Class' variable); this would be the same with an ANOVA (independent samples / unrelated), only with more than 2 such numbers.

This data set is available in Teaching Methods.csv

|  |  |  |
| --- | --- | --- |
| Participant | Score | Class |
| 1 | 18 | 1 |
| 2 | 21 | 1 |
| 3 | 16 | 1 |
| 4 | 22 | 1 |
| 5 | 19 | 1 |
| 6 | 24 | 1 |
| 7 | 17 | 1 |
| 8 | 21 | 1 |
| 9 | 23 | 1 |
| 10 | 18 | 1 |
| 11 | 14 | 1 |
| 12 | 16 | 1 |
| 13 | 16 | 1 |
| 14 | 19 | 1 |
| 15 | 18 | 1 |
| 16 | 20 | 1 |
| 17 | 12 | 1 |
| 18 | 22 | 1 |
| 19 | 15 | 1 |
| 20 | 17 | 1 |
| 21 | 22 | 2 |
| 22 | 25 | 2 |
| 23 | 17 | 2 |
| 24 | 24 | 2 |
| 25 | 16 | 2 |
| 26 | 29 | 2 |
| 27 | 20 | 2 |
| 28 | 23 | 2 |
| 29 | 19 | 2 |
| 30 | 20 | 2 |
| 31 | 15 | 2 |
| 32 | 15 | 2 |
| 33 | 18 | 2 |
| 34 | 26 | 2 |
| 35 | 18 | 2 |
| 36 | 24 | 2 |
| 37 | 18 | 2 |
| 38 | 25 | 2 |
| 39 | 19 | 2 |
| 40 | 16 | 2 |

1. State the null and alternative hypotheses.
2. Which test is appropriate here?
3. Input the data in Jamovi. Make sure to edit the variables data type accordingly to be able to perform the test.
4. Perform the analysis and interpret the results.