Chapter 5 – Analysis of Differences

**Exercise 1**

The data below shows police officers’ scores before and after a training course.

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

|  |  |  |
| --- | --- | --- |
| Officer | Grade Before | Grade After |
| 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 feedback technique used by police to reduce antisocial street behavior without arrests. A total of 8 policing areas are engaged in the study and the number of incidents of illicit or aggressive behavior are measured both for a month before the introduction of the feedback method and then again for a month afterwards. The data are shown below (you will also find this in the Feedback Technique.csv file).

|  |  |  |
| --- | --- | --- |
| **Area** | **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**

The police officers from Exercise One have had a further training course. The scores were recorded as below.

|  |  |  |  |
| --- | --- | --- | --- |
| **Officer** | **Before** | **After**  **First Training Course:** | **After Second Training**  **Course:** |
| 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 Police Training 2.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**

Let us consider whether or not contact with foreigners in general will have an effect on police officers' attitudes to refugees specifically. One set of participants in a study live in an area with a high proportion of foreign tourists; the other set does not encounter foreigners so much. Do note that each separate group needs to be represented by a number (here, within the 'Group' 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 Refugee Study.csv

|  |  |  |
| --- | --- | --- |
| Participant | Score | Area |
| 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.