SLAN0012: Practice final exam

**Important points:**

* You should answer all 4 questions.
* For all questions ensure that you check all the relevant assumptions for the particular statistical test you use, and include an appropriate graph with the axes correctly labelled. An effect size statistic should also be included when appropriate.
* Type all your answers into the word processor of your choice. You may include graphs you generate in SPSS (or any other way) but do not otherwise copy-and-paste undigested tables from SPSS.
* Submit your final word processor file through the Moodle site with your coursework number as its name - in other words, something like *XYZ123.docx.* You may find it useful when reviewing your paper later to have access to the original data, so you should probably save all your data files and SPSS output. None of that will be submitted.
* Type your coursework number and not your name on the first page of the script as well as in a header or footer so it appears on every page.
* This will be a 24 hour exam. However, we don’t expect you to work on it for the full 24 hours! Something along the lines of 2 hours should be enough, but you have more time if you need it.
* Remember: the data you are given in the Excel file may not necessarily be in the correct format for the analysis you need to do. In other words, you may need to re-structure the data.

|  |  |
| --- | --- |
| Y1 | Y2 |
| 89 | 83 |
| 108 | 100 |
| 86 | 85 |
| 109 | 93 |
| 102 | 98 |
| 98 | 77 |
| 126 | 105 |
| 153 | 86 |
| 114 | 96 |
| 128 | 105 |
| 111 | 106 |
| 110 | 115 |

**Q1:** A group of 12 first year and 12 second year students were recruited for a study concerned with measuring nonverbal IQ (nvIQ). From the data set given here, and in the file DataForPracticeExam.xlsx:

1. Draw a boxplot to compare the distribution of values in the two groups. Assess whether there are any points you would want to exclude from further analysis.
2. Do an appropriate statistical test to determine if the mean nvIQ is the same for the two groups. State the null hypothesis for such a test and an alternative hypothesis.
3. Write a summary statement about your analysis, and what you can conclude from it.

|  |
| --- |
|  |

|  |  |
| --- | --- |
| age | words |
| 8.1 | 56 |
| 6.5 | 48 |
| 9.3 | 61 |
| 9.7 | 66 |
| 7 | 46 |
| 10.4 | 64 |
| 6.2 | 44 |
| 5.7 | 38 |
| 7.9 | 58 |
| 8.4 | 56 |
| 5.1 | 41 |

**Q2:** 10 primary school-age children of varying ages are assessed on the number of words they can identify on a picture test of word recognition in which there are 100 possible words. The main question we are interested in is the way in which performance on this task changes with age. You can assume that the outcome variable is normally distributed in the appropriate way. From the data set given here, and in the file DataForPracticeExam.xlsx:

1. Make a plot that would be appropriate to indicate the way in which performance on this task changes with age. Also draw on it a best-fitting line.
2. Using an appropriate analysis, determine if performance changes with age.
3. Write a summary statement about your analysis, and what you can conclude from it, including the rate at which children learn new words (i.e., how many new words each child learns, on average, in 1 year), giving the equation that describes this relationship.

**Q3:** You want to test the efficacy of a new six-month reading comprehension intervention for people with aphasia. You recruit two groups of people with aphasia, one of which participates in the intervention (treated), and one of which does not (control). You test reading performance before the trial begins and when it finishes. From the data set given in the file DataForPracticeExam.xlsx:

1. Generate an appropriate graph of the results.
2. Run an appropriate statistical test in order to assess whether or not the treatment has been effective, whilst making sure you perform all the appropriate checks on the data that allow the use of the particular statistic you choose.
3. Write an appropriate summary statement about your conclusions.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| control |  |  | treated |  |
| pre | post |  | pre | post |
| 93 | 87.4 |  | 88.7 | 98.5 |
| 89.2 | 73.2 |  | 94.3 | 87.4 |
| 81.5 | 86.6 |  | 83.1 | 96.1 |
| 77.9 | 71.7 |  | 84.9 | 85.5 |
| 83.9 | 82.7 |  | 83.6 | 81.2 |
| 72.2 | 92 |  | 86.4 | 96.2 |
| 81.7 | 92.2 |  | 90.5 | 94.5 |
| 76 | 84 |  | 75.6 | 89 |
| 95.1 | 89.5 |  | 90.6 | 101.3 |
| 101.5 | 95.2 |  | 89.4 | 80.6 |
| 91.1 | 88.2 |  | 67.4 | 100.5 |
| 93.7 | 82 |  | 87.8 | 97.2 |
| 75.9 | 75.2 |  | 93.9 | 95.5 |
| 78.4 | 87.1 |  | 77 | 82.6 |
| 98.4 | 83.2 |  | 91.7 | 91.3 |
| 82.1 | 77.9 |  | 78.5 | 104.3 |
| 85.9 | 91.7 |  | 88.5 | 84.1 |
| 89.2 | 72.6 |  | 82 | 88 |
| 95.9 | 82.6 |  | 76.5 | 94.7 |
| 68.7 | 71.4 |  | 80.2 | 76.3 |

**Q4:** A sample of first and second year SLT students were asked which modules they thought were most fun. The resulting data are in the table here:

|  |  |  |  |
| --- | --- | --- | --- |
|  | phonetics | management of communication disorders | statistics |
| Y1 | 20 | 35 | 24 |
| Y2 | 12 | 53 | 15 |

1. Write a short description of the results of an appropriate statistical analysis, in order to determine whether first and second year students differ in the modules they think are the most fun.
   1. Try to make a summary statement about what differences are leading to statistically significant results, if any. You may find that generating and including a bar chart might be useful for this.
2. Suppose we were only interested in the question of whether first and second years differed in the frequency with which they thought *statistics* was the most fun, as opposed to other modules (phonetics and management of communication disorders). Construct the contingency table you would need to analyse in order to answer this question from the data set given above. Then do the appropriate analysis and report your conclusions.