# AS4 (Assignment 4, Unit 5)

**SECTION I**:

A randomized study on n=25 10-year-olds tested whether classrooms that had more than 30 students had an effect on academic performance. Based on this information, please answer questions 1-6

1. What is the researcher's hypothesis?
Classes that have more than 30 students will have an effect on academic performance.

2. What is the null hypothesis?
Classes that have more than 30 students will not have an effect on academic performance.

3. What is the independent variable? Class size

4. What is the dependent variable? Academic performance

5. What research design appears apparent here? Between-subject design

6. What is the appropriate hypothesis test? Independent measures t-test

A researcher wishes to know whether a newly developed teaching method has an effect on 5th grading reading scores. A sample of 5th graders are given a standardized test at the beginning of the school year and retested at the end of the school year. Based on this scenario, answers questions 7-12.

7.  What is the researcher's hypothesis?
The newly developed teaching method will have an effect on 5th grade reading scores.

8. What is the null hypothesis?
The newly developed teaching method will not have an effect on 5th grade reading scores.

9. What is the independent variable? The newly developed teaching method

10. What is the dependent variable? 5th grade reading scores.

11. What is the name of the "research design? Within-subject research design

12. What is the appropriate hypothesis test to analyze the data from this study? Dependent measures t-test

**SECTION II:**

13. What is the definition of a random sample?
The definition of a random sample is that everyone in the population has an equal chance to be selected for the sample.

14.  What is the definition of random assignment?
The definition of random assignment is that everyone in the sample has an equal chance of being put into the control group or the experimental group.

15. Imagine that the researcher failed to use a random sample. How would this failure limit her study's conclusions?
If a researcher failed to use a random sample, then the study's conclusions would be limited because not everyone would have an equal opportunity to be selected for the sample. This would cause inaccurate conclusions due to the researcher wanted to study a population and the random sample not being an accurate generalization of the population of interest.

16.  Imagine that the researcher failed to use random assignment in her study. How would this limit her research conclusions?
If the researcher failed to use random assignment in her study, then the researcher couldn't assume the only difference between the two groups is the independent variable. It allows the researcher to assume that before the experiment begins both groups are about equal on all individual variables (IQ, age, education, etc.) except for the independent variable.


17. No matter what hypothesis test you are using, there are two basic "differences" that you are analyzing in ALL hypotheses tests. What are these two "differences"?

 l. The difference between the means we believe is caused by the independent variable (IV)

2. The differences between means due to ERROR (just by chance)

18. What is meant by the term "statistical significance"?
Statistical significance means that the results are better than chance.

**SECTION III:**

A researcher tested whether drinking caffeine had an effect on anxiety. Below is an SPSS printout from an "independent measures t-test for the data he collected:

**Group Statistics**

|  | VAR00002 | N | Mean | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|---|
| VAR00001 | 1.00 | 7 | 4.5714 | .97590 | .36886 |
|  | 2.00 | 7 | 4.7143 | .75593 | .28571 |

**Independent Samples Test**

|  |  | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | 95% Confidence Interval of the Difference | |
|---|---|---|---|---|---|---|---|---|---|---|
|  |  | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | Lower | Upper |
| VAR00001 | Equal variances assumed | .485 | .499 | -.306 | 12 | .765 | -.14286 | .46657 | -1.15942 | .87371 |
|  | Equal variances not assumed |  |  | -.306 | 11.294 | .765 | -.14286 | .46657 | -1.16652 | .88080 |

19. Please write the "statistical statement" for the above SPSS results:

Answer: t (12) = -.306, p> .05

20. What decision did you make at end of this test? Fail to reject the null hypothesis

21. Are the data significant?   Yes_____   or        No ___√___

22. Please write up the complete results for the above test:
The mean for the group received caffeine was M= 4.57 with a SD= .98. The mean for the group who did not receive caffeine was M= 4.71 with a SD= .76. The data failed to reach significance, t(12)= -.306, p> .05.

A researcher tested whether a particular lecture would have an effect on motivation. Below is an SPSS printout of a Paired Samples Test she used to analyze her data:

**Paired Samples Statistics**

|        |          | Mean   | N | Std. Deviation | Std. Error Mean |
|--------|----------|--------|---|----------------|-----------------|
| Pair 1 | VAR00001 | 3.6000 | 5 | .89443         | .40000          |
|        | VAR00002 | 5.4000 | 5 | .89443         | .40000          |

**Paired Samples Test**

|        |                     | Paired Differences | | | 95% Confidence Interval of the Difference | | | | |
|--------|---------------------|---------|----------------|-----------------|----------|----------|--------|----|----------------|
|        |                     | Mean    | Std. Deviation | Std. Error Mean | Lower    | Upper    | t      | df | Sig. (2-tailed) |
| Pair 1 | VAR00001 - VAR00002 | -1.80000 | 1.09545       | .48990          | -3.16017 | -.43983  | -3.674 | 4  | .021           |

22. Please write the "statistical statement" for the above SPSS results:

Answer: <u>t (4) = -3.674, p<.05</u>

23. Did you reject or fail to reject the null hypothesis? <u>Reject the null hypothesis</u>

24. Is this a within or between subject design? <u>Within-subject design</u>

25. Are the data significant? Yes__√___ No_____

26. Is there a probability of Type I Error?  Yes__√___ No_____

27. Please write up the research results for the above:
<u>The mean for motivation before receiving the lecture was M= 5.4 with a SD= .89. The mean for motivation after receiving the lecture was 3.6 with a SD= .89. Our data were significant. Our data supports that the particular lecture did have an effect on motivation, t (4) = -3.674, p<.05.</u>