*Please determine the best analytical method for each of the 8 questions below and conduct the appropriate analysis. Write up the analysis for each and submit on Canvas.*

1. A school psychologist would like to test the effectiveness of a behavior-modification technique in controlling classroom outbursts. Every time a child has an outburst, then ten minutes of free time is taken away. Four children were followed for six months and numbers of outbursts were recorded before treatment and then six months after treatment. The psychologist wants to see if there is a decline in outbursts over time. Test the null hypothesis that there is no difference in outbursts. Use a .05 alpha level.

|  |  |  |
| --- | --- | --- |
| **Student** | **Baseline** | **Six months after** |
| A  B  C  D | 8  4  6  8 | 2  1  2  3 |

Introduction

A paired sample t-test is used to test if there is a significant decrease in classroom outburst after administering a behavioral modification technique to the students. Dependent sample t-test is appropriate because the same students were tested at follow-up.

Descriptive statistics

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| --- | --- | --- | --- | --- | --- |
| **Paired Samples Statistics** | | | | | |
|  | | Mean | N | Std. Deviation | Std. Error Mean |
| Pair 1 | Baseline | 6.5000 | 4 | 1.91485 | .95743 |
| After | 2.0000 | 4 | .81650 | .40825 |

It can be observed from the descriptive statistics table above that the mean outburst at baseline (M = 6.5, sd = 1.915) is greater than the mean outburst at six months after (M = 2.0, sd = 0.817).

Primary analysis

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *Paired Samples Test* | | | | | | | | | | |
|  | | Paired Differences | | | | | t | df | Sig. (2-tailed) | |
| Mean | Std. Deviation | Std. Error Mean | 95% Confidence Interval of the Difference | |
| Lower | Upper |
| Pair 1 | Baseline - After | 4.50000 | 1.29099 | .64550 | 2.44574 | 6.55426 | 6.971 | 3 | .006 |

Test statistics: paired sample t-test

One-sided p-value = 0.006/2 = 0.003

Effect size = 6.972^2 / (6.972^2 + 3) = 0.942

**Summary**

The difference between the scores at baseline and at six months after was statistically significant t(3) = 6.971, p = 0.006.

Reject the null hypothesis because the p value < 0.05. There is sufficient evidence to support the Psychologist’s claim that there is a decline in outburst.

**Write-up**

A dependent sample t-test was conducted to compare student’s outburst at pretreatment and at post treatment. A random sample of 4 students was used to test the hypothesis that there is no difference in outburst between post treatment and pretreatment. The mean number of outburst at baseline was 6.5 (1.915) and at six months after administering the treatment was 2.0 (0.817). The mean difference between pre and post treatment was 4.5 (1.291). The difference between pre and post was statistically significant t(3) = 6.971, p = 0.006. The results suggest that the treatment program is effective in reducing the number of student’s outburst.

1. An education statistics professor wants to see if her class has a similar average GRE quantitative score as the national average of 500. The class members have the following scores. Use an alpha level of .05.

|  |
| --- |
| Class GRE Quant Scores |
| 450.00  550.00  525.00  500.00  425.00  400.00  515.00  520.00  500.00  480.00  490.00  510.00  650.00  600.00  400.00  425.00  620.00  500.00 |

Hypotheses

H0: µ = 500

Ha: µ ≠ 500

1. A soccer coach conducts a keeper clinic over the summer. She uses two different techniques to train – one for morning session children (n=13) and one for afternoon session children (n=13). She records the number of saves made by keepers at an end-of-summer drill. She wants to see if there was a difference in number of saves by keepers in the morning sessions and afternoon sessions, thereby indicating that one method would be better than the other. Use a .05 alpha level.

|  |  |
| --- | --- |
| **Morning Session Keepers  (method 1)** | **Afternoon Session Keepers  (method 2)** |
| 5  7  5  2  7  6  10  2  5  4  3  5  9 | 12  15  8  12  15  10  15  8  4  11  7  12  16 |

1. A professor gives a standardized achievement test to students after going through a course in sociology. She wants to see if her students scored similarly to the national average of sociology students on the test. The population of first year sociology students has an average score of 170 on the test. Use an alpha level of .05 and determine if there is a difference between her students’ scores and the population mean.

|  |  |
| --- | --- |
| **Student Number** | **Score** |
| 1  2  3  4  5  6  7  8  9 | 120  125  130  150  160  160  175  190  140 |

1. An English teacher wants to see if composition scores for three classes in her school are similar or different. She suspects that there are teacher differences in how composition is taught. At the end of the semester she collects scores from a standard composition test from students in each class. She has a teacher from another school score the tests, and then she takes a random sample of the scores. The scores for each class are listed below. Test the null hypothesis that there is no difference in scores. Use an alpha level of .05.

|  |  |  |
| --- | --- | --- |
| **Teacher A** | **Teacher B** | **Teacher C** |
| 57  74  82  72  74  70  62  25  85  88 | 77  74  80  85  43  76  89  30  74  95 | 85  87  90  93  90  88  92  91  99  89 |

1. A study on the reaction time of children with cerebral palsy reports a mean of 1.6 seconds on a particular task. A research believes that the reaction time can be reduced by using a motivating set of directions. Twelve children were given the motivating set of directions and their reaction times are recorded. A separate sample of twelve children was given no motivating directions, and completed the same task. Test if there is a difference between tes sample with motivating directions and the one without motivating directions. Use an alpha of .05.

|  |  |
| --- | --- |
| Sample Given Motivating Directions | Sample Given No Motivating Directions |
| 1.40  1.80  1.10  1.30  1.60  0.80  1.50  2.00  1.40  1.30  1.80  1.30 | 2.00  1.40  1.30  1.50  2.00  2.00  1.70  2.10  1.55  1.75  2.40  1.50 |

1. A method to improve math achievement was tested by an elementary school teacher. Students were given a math pretest then given the particular math tutoring. After tutoring, a post test was given. Test if there is a difference between pre and post math scores. Use alpha of .05.

|  |  |
| --- | --- |
| Pre-test | Post-test |
| 10  8  11  5  7  10  12  6  8  9 | 12  11  12  10  6  13  8  9  11  13 |

1. An educational psychologist designs a research study to investigate different problem-solving strategies. Subjects are randomly assigned to one of five different groups. Each group is taught to use a different problem-solving strategy. After the training, each subject is given a series of problems to solve using the various strategies. The data below are times each subject spent solving the problems. Test the hypothesis that there is no difference among groups in terms of time spend solving a problem. Use and alpha of .05.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Strategy 1 | Strategy 2 | Strategy 3 | Strategy 4 | Strategy 5 |
| 32  41  53  67  48  39  44 | 30  39  52  64  51  37  44 | 85  76  70  66 | 38  29  21 | 53  43  47  52  67 |