**SPSS Practical 12: Non-parametric Test**

Perform the following non-parametric tests:

1. Mann-Whitney Test (Wilcoxon rank-sum Test)

**Normality Test**

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| --- | --- | --- | --- | --- | --- | --- |
| **Tests of Normalitya** | | | | | | |
|  | Kolmogorov-Smirnovb | | | Shapiro-Wilk | | |
| Statistic | df | Sig. | Statistic | df | Sig. |
| Values | .295 | 13 | .003 | .805 | 13 | .008 |
| a. Sample = Sample A | | | | | | |
| b. Lilliefors Significance Correction | | | | | | |

k-s test

D (13) = 0.295, sig=0.003(<0.05)

This test is significant.

Reject H0

Conclusion : This data is not normal distribution.

|  |  |
| --- | --- |
| **Test Statisticsa** | |
|  | Values |
| Mann-Whitney U | 31.000 |
| Wilcoxon W | 97.000 |
| Z | -2.346 |
| Asymp. Sig. (2-tailed) | .019 |
| Exact Sig. [2\*(1-tailed Sig.)] | .018b |
| a. Grouping Variable: Sample | |
| b. Not corrected for ties. | |
|  | |

Since sig = 0.019(<0.05)

This test is significant.

Reject H0.

Conclusion : Two populations have distribution functions differ only with respect to location (median)

1. Wilcoxon signed-rank Test

**Normality test**

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| --- | --- | --- | --- | --- | --- | --- |
| **Tests of Normality** | | | | | | |
|  | Kolmogorov-Smirnova | | | Shapiro-Wilk | | |
| Statistic | df | Sig. | Statistic | df | Sig. |
| diff | .231 | 10 | .139 | .778 | 10 | .008 |
| a. Lilliefors Significance Correction | | | | | | |

s-w test

D (10) = 0.778, sig=0.008(<0.05)

This test is significant.

Reject H0.

Conclusion : This is not a normal distribution.

Since the difference between Sample A and B is not normal, we will use Wilcoxon signed-rank test to compare the mean.

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| --- | --- |
| **Test Statisticsa** | |
|  | Sample\_B - Sample\_A |
| Z | -.255b |
| Asymp. Sig. (2-tailed) | .798 |
| a. Wilcoxon Signed Ranks Test | |
| b. Based on positive ranks. | |

Since sig=0.798(>0.05)

This test is non-significant.

Accept H0

Conclusion : median = 0

1. Kruskal-Wallis (homogeneity of variance test)

**Homogeneity of variance test**

|  |  |  |  |
| --- | --- | --- | --- |
| **Test of Homogeneity of Variances** | | | |
| Sleep\_Duration | | | |
| Levene Statistic | df1 | df2 | Sig. |
| 4.677 | 2 | 9 | .040 |

F (2,9) = 4.677, sig=0.040(<0.05)

This test is significant.

Reject H0

Conclusion : Homogeneity of variance cannot be assumed.

|  |  |  |  |
| --- | --- | --- | --- |
| **Ranks** | | | |
|  | Drug | N | Mean Rank |
| Sleep\_Duration | Drug 1 | 3 | 5.83 |
| Drug 2 | 4 | 6.13 |
| Drug 3 | 5 | 7.20 |
| Total | 12 |  |

|  |  |
| --- | --- |
| **Test Statisticsa,b** | |
|  | Sleep\_Duration |
| Chi-Square | .335 |
| df | 2 |
| Asymp. Sig. | .846 |
| a. Kruskal Wallis Test | |
| b. Grouping Variable: Drug | |

Since sig=0.846(>0.05)

This test is non-significant.

Accept H0

Conclusion : All populations have identical distribution functions.

1. Friedman Test

|  |  |
| --- | --- |
| **Ranks** | |
|  | Mean Rank |
| Drug\_1 | 2.70 |
| Drug\_2 | 2.30 |
| Drug\_3 | 1.00 |
| Drug\_4 | 4.00 |

|  |  |
| --- | --- |
| **Test Statisticsa** | |
| N | 5 |
| Chi-Square | 14.020 |
| df | 3 |
| Asymp. Sig. | .003 |
| a. Friedman Test | |

Since sig=0.003(<0.05)

This test is significant.

Reject H0

Conclusion : At least two populations with different median.

**// Table은 하나만 주어진다. 테스트 진행하라는 말만 나오고, 변수는 알아서 골라서 진행해.**