NEMATYC 2018

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Applying Mathematics to the Future

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"Nonparametric Statistics Using *Excel*"

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Abstract –

Following last year's NEMATYC conference, I will use Excel 2016 to demonstrate two more nonparametric statistics tests = Kruskal-Wallis and Wilcoxon Rank-Sum. In much the same way that the parametric ANOVA stat can be used to test three or more means, ANOVA can also be used to test two independent means (instead of the two sample t-test). The nonparametric ANOVA Kruskal-Wallis stat can be used to test three or more medians; Kruskal-Wallis can also be used to test two independent medians (instead of the Wilcoxon Rank-Sum test).
Two Tests – One Nonparametric Statistic: 1. Kruskal-Wallis, 2. Wilcoxon Rank-Sum = √(Kruskal-Wallis)

Technology Used

- *Excel – Microsoft Office 2010 or later*

Journal of Statistics Education

- Volume 21, Number 1 (2013) www.amstat.org/publications/jse/v21n1/schwartz.pdf
- *GAISE* Recommendation #3. Integrate real data.
- Recommendation #4. Foster active learning in the classroom. (Computer lab activities)
- Recommendation #5. Use technology to explore concepts and analyze data. (Spreadsheets/Statistics Software)

Elementary Statistics by Triola

- *12th edition* – Chapter 13-5 = Kruskal-Wallis Test, pages 661 – 666.

Kruskal-Wallis Equation:

$$H = \frac{12}{N(N+1)} \sum \frac{R_i^2}{n_1} - 3(N+1)$$

Dunn Multiple Comparison Equation:

$$Q = \left| \frac{R_i}{n_i} - \frac{R_j}{n_j} \right| / \sqrt{\frac{N(N+1)}{12}\left(\frac{1}{n_i} + \frac{1}{n_j}\right)}$$

References

- *Elementary Statistics 12th edition* by Triola
- *Excel 2010* by Microsoft
- ***GAISE*** *College Report*, 2016, funded by the American Statistical Association
- http://www.amstat.org/education/gaise
- https://www.itl.nist.gov/div898/software/dataplot/refman1/auxillar/kruskwal.htm

Thank You

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