Math 8452, Homework #3. Due on 6/17/20 (Wed section) or 6/18/20 (Thu section).

Reading from the textbook:

- Read Section 4.5 on relative efficiency and Section 5.1 on the Ansari-Bradley test.
- Read Section 5.4 on the two-sample Kolmogorov-Smirnov test.
- For next week, read Sections 6.1 and 6.2 on the Kruskal-Wallis and Jonckheere-Terpstra tests.

Problems to do:

1. (Not to turn in.) Using listing, find the exact null distribution of the Ansari-Bradley statistic for the case where $n_1 = 3$, $n_2 = 4$, and the statistic is obtained by summing the scores for values assigned to the first sample. Is it possible to do a one-sided test at level 0.05? Please explain.

2. (To turn in.) By thinking about the alternatives that each test is sensitive to, create small data sets (no more than 10 in each of the two samples) with each of the following properties. Please use the built-in R functions to run the tests. (a) The rank sum test rejects equality of distributions at level 0.05, but the Kolmogorov-Smirnov test does not. (b) The rank sum test rejects equality of distributions at level 0.05, but the Ansari-Bradley test does not.

3. (To turn in.) Data from a completely randomized experiment is given in the table below. Find the permutation distribution of the difference in sample medians. Compute the p-value for a one-sided test where the alternative is that values for Treatment 1 tend to be bigger.

Treatment	Values		
1	10	15	50
2	12	17	19

4. (To turn in - R code and written answers) What happens to the α level for the Ansari-Bradley test when the equal centers assumption is violated? To answer, do a simulation study in which you generate random samples of size 20 from (i) the $N(0, 1)$ distribution and (ii) the $N(\Delta, 1)$ distribution. Specifically, estimate the rejection rate for a level-0.05 test when Δ ranges from 0 to 4. What do you conclude about whether the test is robust to the equal centers assumption?

5. (To turn in.) Using listing, find the exact null distribution for the two-sample Kolmogorov-Smirnov test statistic when $m = 2$ and $n = 4$.

这个要知道用什么方法去做，和列表也有规律

这个计算Dks太容易错了

xyxxyx 是1/4 还是0.5，我把图画出来了一下就看出

6. (Not to turn in.) Do problem 33 from page 198. Also plot the data and comment.

7. (To turn in.) Read the article by Lehmann that was sent out by e-mail. Using no more than a few sentences for each part, answer each of the following. (a) What is meant by an asymptotic relative efficiency (ARE)? (b) There are many different nonparametric tests from which one might choose. What danger does this present? (c) What can be said about the relative performance of the t test and the Wilcoxon rank sum test?

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