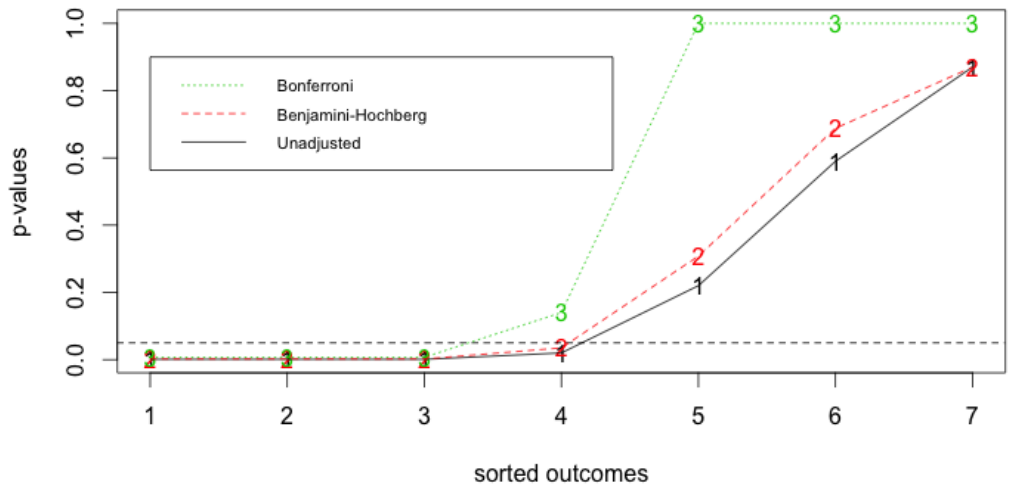
MULTIPLE TESTING & PERMUTATION TESTS

CLASS ACTIVITY

1. The following array *p* consists of the observed significance values for multiple correlation tests.
   p = [0.0050 0.0010 0.0100 0.0005 0.0009 0.0400 0.0560 0.0500 0.0480 0.0130 0.0370 0.0430 0.0020 0.0250 0.1100 0.0700 0.0800]
   Apply both Bonferroni and Benjamini-Hochberg correction and create a graph as shown below with the observed/unadjusted p-values, Bonferroni corrected and BH-corrected ones for all the tests sorted and comment on the results (ensure you also plot the black dashed line that represents an alpha level of .05). The relevant function is **p.adjust** in R. The Bonferroni method is known to be a more conservative approach. Do the results of the correction support that?
   .



2. The following link (https://1drv.ms/x/s!AtoLT6JDyxo-ihZ0hgcp2XvRoIZX?e=9IKbQh) contains data from the study that investigated attractiveness of humans post consumption of beer to mosquitoes. There were two groups: *Group 1*: 25 participants who drank beer; *Group 2*: 18 participants who drank tap water. They hypothesized (H_A) that individuals who drank beer would attract more mosquitoes than those who drank water. It was found that, on average, participants in Group 1 attracted more mosquitoes than Group 2.
   a. Calculate the difference between group medians and perform a permutation test (10000 iterations) to calculate the significance of

the observed statistic. Also plot a histogram displaying the bootstrap distribution.

b. Repeat step ‘a’ on the t-statistic instead of difference in medians..
c. Assuming a non-directional H_A (suggesting that there will be a difference in groups), calculate the new significance values of the above observed statistics.

3. In the IQ dataset on moodle, calculate the correlation between IQ and testscores. Perform a permutation test and calculate the significance of the observed test statistic (i.e. correlation). Use 10,000 iterations to create the bootstrap distribution of the test statistic. Based on your calculated significance, would you reject or accept the null hypothesis that there exists no correlation between IQ and testscores?