Université de Lorraine, Master de mathématique, 2e année, Année 2023-2024, Semestre 1.

MSDC part 1, to understand the lecture

1. About the p-values
   (a) A friend of you who studies biology uses R to perform a test to compare two fertilizers on a crop and obtains a p-value of 0.5. What do you say to him ?
   (b) You have two qualitative covariates and a status of a disease. The p-value of chi-square test between the covariate 1 and the disease is $pv = 10^{-6}$ and with covariate 2 , $pv = 0.1$. What do you think ?
   (c) Slide 14, do the calculations to retrieve the results of R, what is the conclusion ?
   (d) Slide 16, do the calculations to retrieve the results of R, what is the conclusion ?
   (e) Slide 17, what is the conclusion ?
   (f) Slide 19, compute the probability to have at least a type 1 error in the p tests for the different given values.
2. About multiple testing
   (a) Slide 23, compute the corresponding Sidak adjusted p-value.
   (b) We perform $p = 10$ test in order to compare the distribution of p continuous variates between two populations

Variable index	1	2	3	4	5	6	7	8	9	10
p-value	0.4	0.05	0.02	0.0001	0.001	0.005	0.07	0.04	0.01	0.02

   Give the selection of the significant variables at the level $\alpha = 0.05$ in the following cases :
      i. Without multiple testing method
      ii. Bonferroni
      iii. Sidak
      iv. Holms Method
      v. Benjamini and Hochberg