MATH 4773 Laboratory 10: The Analysis of Variance

Learn the logic of ANOVA and how to interpret the results

# Objectives

1. Learn the statistics in action example and solution! PAH file.
2. Learn one way ANOVA
3. Learn two way ANOVA
4. Learn multiple comparisons

### Tasks

Do everything in RMD knit to HTML and place on CANVAS

* Task 1
  + Download from CANVAS the zipped data files, “Dataxls”
  + Unzip the contents into a directory on your desktop (call it LAB)
  + Download the file “Lab10.R”
  + Place this file with the others in LAB10.
  + Start Rstudio
  + Open “lab9.r” from within Rstudio (this is an exemplar file).
  + Using hash commenting and at the top of Lab 10 place the task number eg #Task 1
  + Go to the “session” menu within Rstudio and “set working directory” to where the source files are located.
  + Copy and paste the working directory by issuing the command getwd(): under #Task 1
* Task 2
  + In this task we will learn what 1 – way ANOVA does.
  + Suppose we wish to use two samples to carry out a test against – assuming that the two populations are Normal in their distributions with common variance.
  + Use the Lab 10 code to make two sets of samples:

set.seed(12);y1 = rnorm(10,14,5)

set.seed(13);y2 = rnorm(10, 15, 5)

and

set.seed(12);y11 = rnorm(10,14,10)

set.seed(13);y22 = rnorm(10, 15, 10)

* + Create the following: (horizontal lines are means, put your name on the plots)

|  |  |
| --- | --- |
|  |  |

* + Using page 745 calculate
    - Within – sample variation: for each of the above: Place here:
    - Between-sample variation: for each of the above: Place here:
  + Using pg 745 create for both plots. Place here:
  + What do you conclude from the F statistics?
* Task 3
  + Summarize the F test for comparing nested models. Pg 686
  + What is the algebraic expression for ?
  + Define all parts of
  + Now apply this to what you did in Task 2 by:
    - Calculating a P-value for the two tests associated with the F values generated
    - Plot the F distribution using the correct degrees of freedom for each Test
    - Show the P values for each plot (shade with 4 dec values for P value)
* Task 4
  + Do example 14.3 in R
  + Answer the question from the output!