hw4 4: T Test vs Permutation Test

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* For hw3 you may refer to act3 very carefully.
* Act3 has lots of information to practice and understand piece-wise.
* Read all the questions very carefully and only answer what is being asked.

# Exercise ex0221

Use the *Bumpus Natural Selection Data*, pg. 54, to answer some questions.

The biologist Hermon Bumpus, in 1899, presented an evidence of natural selection a comparison of numerical characteristics of moribund house sparrows that were collected after an uncommonly severe winter storm and which had either perished or survived as a result of their injuries.

This data can be obtained by using the package **Sleuth3** as a dataset named ex0221.You will also need the package

library(Sleuth3)  
library(coin)  
set.seed(2022)  
dat<-ex0221  
names(dat)

This data contains the length of the humerus (arm bone) in inches for 59 of these sparrows, grouped according to whether they survived or perished.

The main objective is to investigate the difference in the mean humerus length of two groups of sparrows, by meas of t.test and a permutation test.

1. Compute the means of humerus length by the groups of sparrows.
2. Compute the difference in the two group means.
3. Write a function for a permutation test of , where refers to the difference of mean in the population by the groups of sparrows.

* *Note that the function you write should store mean differences of all permutations. See the act3 function if you wish.*
* *Repeat the permutation 5000 times*.
* *Make sure that permutation samples are taken without replacement*

1. Report p.values for the test of against (i) , (ii) , and (iii) , via a permutation test, at 5% level of significance.
2. Report p.values for the test of against (i) , (ii) , and (iii) , via a t.test, at 5% level of significance.
3. Draw a histograms of all permutation mean differences.
4. Draw a vertical line at the value of mean difference of the observed data values
5. Perform permutation test using the function independence\_test() from the package coin.