**STU22004 – Lab 1 Instruction**

As discussed in lecture, Permutation and Combination are two main tool of counting.

Permutation is used to count the number of possible arrangements of k objects out of n, without replacement.

Combination is used to count the number of possible selections of k objects out of n, without replacement.

**Steps of Lab Instruction**

install.packages("gtools")

library(gtools)

x <- c("Red", "Blue", "Green", "Yellow")

#pick 2 balls in order from the urn with replacement

A <- permutations(n=4,r=2,v=x,repeats.allowed=T)

A

nrow(A)

#pick 3 balls in order from the urn with replacement

B <- permutations(n=4,r=3,v=x,repeats.allowed=T)

B

nrow(B)

#pick 2 balls in order from the urn without replacement

C <- permutations(n=4,r=2,v=x)

C

nrow(C)

#pick 3 balls in order from the urn without replacement

D <- permutations(n=4,r=3,v=x)

D

nrow(D)

#calculate the number of combinations

E <- choose(n=24,k=4)

E

#see the list of combinations

F <- combn(letters[1:4], 2)

F

ncol(F)

**Questions:**

Use your student number to do the following steps in R:

Add the first two left digits of your student number and call it n, for instance:

n <- 1+8

Pick the first right digit of your student number, (divide it by 2, round down if required) and call the result k. If this digit is 0 or 1, use 3 instead of them. for instance:

k <- 6/2

Now Answer the following Questions.

Q1. In how many ways you can pick k balls in order from the urn of n with replacement?

Call your answer Q1.

Q2. In how many ways you can pick k balls in order from the urn of n without replacement?

Call your answer Q2.

Q3. In how many ways you can pick k balls from the urn of n with replacement?

Call your answer Q3.

Q4. List the answers for Q3.