hw 3

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# Results

* The total number of permutations of objects, with out replacement, out of distinct objects is
* The total number of permutations of objects, with replacement, out of distinct objects is
* The total number of combinations of objects, with out replacement, out of distinct objects is
* The total number of combinations of objects, with replacement, out of distinct objects is

# Taking permutation and combination samples in R

We will use functions permutations() and combinations() available in package *gtools* for drawing permutation and combination based samples, with and without replacement. The syntaxes are as follows:

combinations(n,r,v=1:n, rep=T)# returns choose(n+r-1,r) samples  
combinations(n,r,v=x, rep=F)# returns choose(n,r) samples  
permutations(n,r,v=1:n, rep=T)# returns n^r samples  
permutations(n,r,v=x, rep=F)# returns nPr samples  
where   
n is the size of the source vector  
r is the size of the target vectors  
v is the source vector, default v=1:n  
v can be any specified vector. If there is any duplications in elements of v, then set=F option is required, which states to keep all duplicated values.

**HW 1**

A vector of population data is defined as follows:

x=c(1, 2, 3, 4)

1. How many samples with permutation of size 2, with replacement, are possible? Write all the possible permutation samples of size 2, with replacement.
2. How many samples with permutation of size 2, without replacement, are possible? Write all the possible permutation samples of size 2, without replacement.
3. How many samples with combination of size 2, with replacement, are possible? Write all the possible combination samples of size 2, with replacement.
4. How many samples with combination of size 2, without replacement, are possible? Write all the possible combination samples of size 2, with replacement.

**HW 2**

A vector of population data is defined as follows:

x=c(1, 2, 3, 4, 5)

compute the mean and variance of x.

1. Write all the possible permutation samples of size 2, with replacement, and and save these samples as a dataframe pswr.
2. Write the all possible permutation samples of size 2, without replacement, and save these samples as a dataframe pswor.
3. Write the all possible combination samples of size 2, without replacement, and save these samples as a dataframe cswor.

For each of the samples, in (a)-(c) compute the followings:

1. means of all possible samples.
2. mean of means of all possible samples.
3. variance of means of all possible samples.

**HW 3**

A vector of population data is defined as follows:

x=c(21, 18, 19, 17, 15)

compute the mean and variance of x.

1. Write all the possible permutation samples of size 2, with replacement, and and save these samples as a dataframe pswr.
2. Write the all possible permutation samples of size 2, without replacement, and save these samples as a dataframe pswor.
3. Write the all possible combination samples of size 2, without replacement, and save these samples as a dataframe cswor.

For each of the samples, in (a)-(c) compute the followings:

1. means of all possible samples.
2. mean of means of all possible samples.
3. variance of means of all possible samples.

Note that in case (b) and (c), permutations and combinations, WOR, variance of all possible means is , whereas in case (a) with permutations with replacement .