Abdullah Gul University

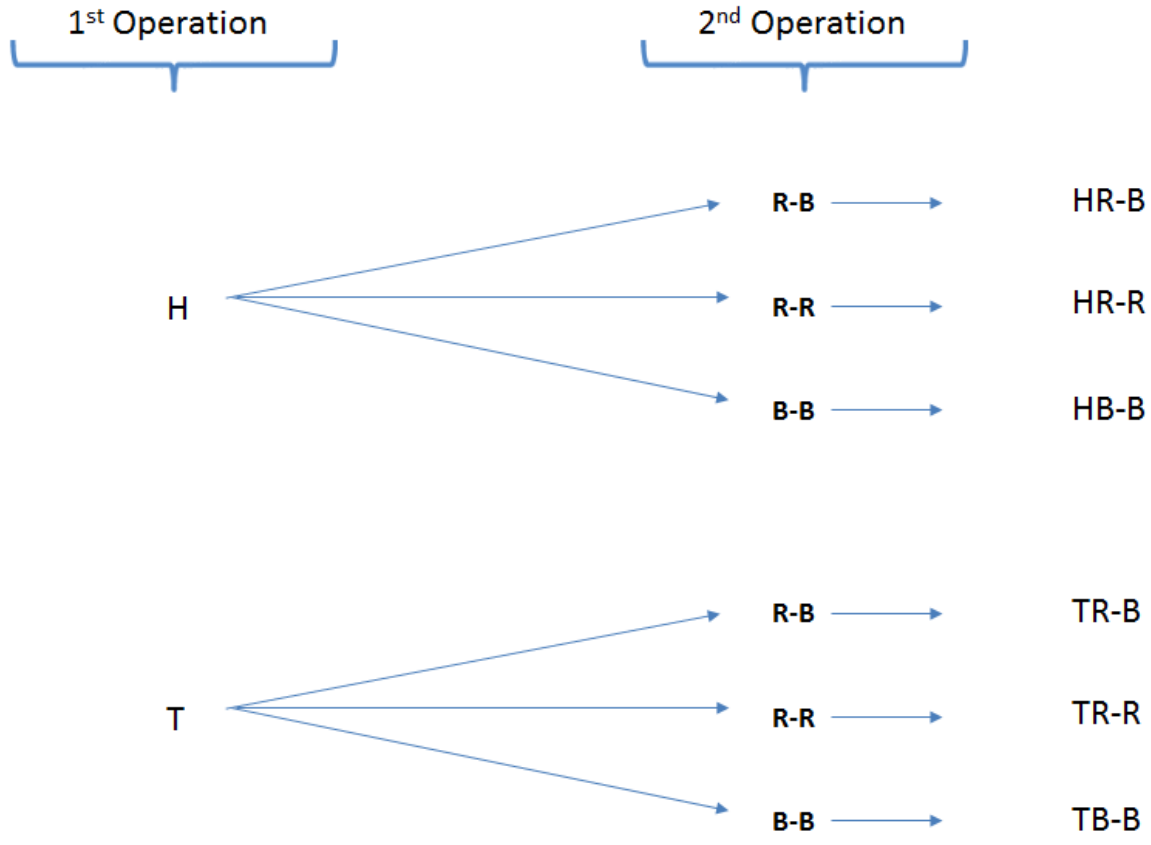
Math-301 (Probability & Statistics)

Fall 2022, QUIZ - II

Name & Surname:
ID Number:

Q 1. (30 pt.) We have a coin and three painted cards. Of these three cards, one is painted red on both sides; one is painted black on both sides; and one is painted red on one side and black on the other. If an experiment consists of flipping the coin and selecting one of the painted cards, show what sample points exist in the sample space, **by drawing tree-diagram**?

SOLUTION:



Q 2. (40 pt.) There are a total of 7 Spanish, 2 English, and 6 Turkish people in a working area. How many ways does the sample space occur for the selection consist of 3 Spanish, 1 English, and 3 Turkish people to form a committee?

SOLUTION:

The first operation is to select 3 Spanish among 7 Spanish people. The second operation is to select 1 English among 2 English people. Finally, the third operation is to select 3 Turkish among 6 Turkish people. So, for the first operation, 7 Spanish people should be partitioned into 3-people and the other 4-people parts. For the first operation, the sample space consists of some ways as below;

$$\#S_1 = \frac{7!}{(3!)(4!)} = \frac{(7)(6)(5)(4!)}{(3)(2)(1)(4!)} = 35$$

For the second operation, 2 English people should be partitioned into 1-person and the other 1-person parts. So, for the second operation, the sample space consists of some ways as below;

$$\#S_2 = \frac{2!}{(1!)(1!)} = \frac{(2)(1)}{(1)(1)} = 2$$

For the third operation, 6 Turkish people should be partitioned into 3-people and the other 3-people parts. So, for the second operation, the sample space consists of some ways as below;

$$\#S_3 = \frac{6!}{(3!)(3!)} = \frac{(6)(5)(4)(3!)}{(3)(2)(1)(3!)} = 20$$

Then, to find the number of the whole sample space, we can apply the multiplication rule;

$$\#S = (35)(2)(20) = 1400$$

Q 3. (30 pt.)

A student has 10 books that he is going to put on his bookshelf. Of these, 4 are mathematics, 3 are chemistry, 2 are history, and 1 is a language book. He wants to arrange his books so that all the books dealing with the same subject are together on the shelf. How many different arrangements can be possible?

SOLUTION:

For this arrrangement, we need to use 2 different operations; the first one is to arrange the math-group, chem-group, hist-group, and lan-group. So, for this arrangement, we have a total of 4 groups, and the number of the sample space;

$$\#S_1 = \underline{4}\,\underline{3}\,\underline{2}\,\underline{1} = 24$$

The second operation is to arrange the books which are in the same group. So, we have a total of 4! possibilities for the math-group, 3! possibilities for the chem-group, 2! possibilities for the hist-group, and 1! possibilities for the lan-group. So, for this 2nd operation, the number of the sample space;

$$\#S_2 = (4!)(3!)(2!)(1!) = 288$$

After applying the multiplication rule for the operations;

$$\#S = (\#S_1)(\#S_2) = (24)(288) = 6912$$