STATISTICS, Homework Exercises 1.

1. A group of 10 people orders 5 beers, 3 coffees and 2 cakes in a restaurant (each of them orders one item and there is only one flavor of beer, coffee, and cake available). The absent-minded waiter forgets who ordered what, and hence, he randomly gives to each person an item. What is the probability that everybody gets what he/she had wanted.

2. Consider a randomly selected two-children family from a population where the genders of children are independent of each other, but the boy – girl probability is a little bit differs from the $1/2 - 1/2$. How the probabilities below are related to each other? How the difference between the two behaves if we get farther and farther from the $1/2 - 1/2$ ratio?

   (a) The two children have the same gender.
   (b) The two children have distinct genders.

3. Three cooks, A, B, and C bake a special kind of cake, and with respective probabilities 0.03, 0.05, and 0.06 it fails to rise. In the restaurant where they work, A bakes 50 per cent of these cakes, B 30 per cent, and C 20 per cent. What is the average proportion of failures? What proportion of "failures" is caused by A? by B? by C?

4. There are 100 students registered for an overall course, but each of them attends the lectures with probability 0.8, independently. What size of a class (with how many chairs) to reserve if we want to give only 5 percent chance to the situation that a student, arriving to the class, cannot find a chair to sit on.

5. An old joke is that a certain professor left Princeton to go to Stanford and thereby improved the average quality of both departments. Is this possible? Explain your answer!