MATH 10B with Prof. Stankova
02/28/2019

Discussion on Probability and Independence

1. Concept of Independence

   - What is the probability that two people chosen at random were born during the same month of the year?

   - What is the probability that in a group of n people chosen at random, there are at least two born in the same month of the year?

   - How many people chosen at random are needed to make the probability greater than 12 that there are at least two people born in the same month of the year?

2. Two dies were rolled. Are the events that the first die rolled is a 1 and that the sum of the two dice is a 7 independent?

3. Find the smallest number of people you need to choose at random so that the probability that at least two of them were both born on April 1st exceeds $1/2$.

4. Assume that the probability a child is a boy is 0.51 and that the sexes of children born into a family are independent. What is the probability that a family of five children has

   - exactly three boys?
   - at least one boy?
   - at least one girl?
   - all children of the same sex?

5. Let E be the event that a randomly generated bit string of length three contains an odd number of 1s, and let F be the event that the string starts with 1. Are E and F independent?

6. Let E and F be the events that a family of n children has children of both sexes and has at most one boy, respectively. Are E and F independent if

   - $n = 2$
   - $n = 4$
   - $n = 5$