Probability Exam

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Remind before test

Linear combinations of the random variables. Properties of the Expectation and Variation.

Variant 1

1. Urn contains 5 red balls and 10 blue ones. 2 balls were randomly chosen. What is the probability that only one red ball chosen?

2. A committee of seven members is to be divided into three subcommittees of size three, two, and two. How many ways this can be done?

3. Fair dice thrown twice. Event A is that a total number of points is greater than 9, event b is that we got even number at the second throw. Please, find $P(A \cup B)$ and $P(A|B)$. Are A and B independent and why?

4. Random variable S is a number of successes in 4 Bernouli trails with success probability $p = 0.5$. Please, find $P(S < 2)$.

5. Joint distribution of X and Y was set by the following table. First you should fill empty cell and then please compute a marginal distribution for X and find $EX, Var(X), E(X^2 - 3)$.

6. An urn contains three red balls and one blue ball. Two balls are selected without replacement.

$X \backslash Y$	-2	-1	0
0	2/16	1/16	1/16
1	1/16	3/16	2/16
2	5/16	0	?

Table 1: Table for problem 5.

1. What is the probability that they are both red?

2. What is the probability that a red ball is selected on the second draw?

7. Two dice are rolled 200 times, and the number of double sixes, X, is counted. The distribution of X is binomial with n = 200 and p = 1/36 = .0278. Since n is large and p is small, we can approximate the binomial probabilities by Poisson. What is the probability of 3 double sixes in this case?

8.The probability of winning in a certain state lottery is said to be about 1/9. What is the probability that 10th ticket will be first winning?

$X\backslash Y$	-2	-1	0
0	2/27	1/27	1/27
1	1/27	?	2/27
2	5/27	1/27	0

Table 2: Table for problem 5.

Variant 2

1. Urn contains 5 red balls and 3 blue ones. 2 balls were randomly chosen. What is the probability that at least one blue ball chosen?

2. A committee of 10 members is to be divided into three subcommittees of size 5, 3, and 2. How many ways this can be done?

3. Probability of success in selling property during in case of crisis is 0.2 and 0.7 in a stable conditions. Experts said that the crisis probability is 0.85. What is the probability of success in selling property?

4. Two dice are rolled 100 times, and the number of double sixes, X, is counted. The distribution of X is binomial with n = 100 and p = 1/36 = .0278. Since n is large and p is small, we can approximate the binomial probabilities by Poisson. What is the probability of 3 double sixes in this case?

5. Joint distribution of X and Y was set by the following table. First you should fill empty cell and then please compute a marginal distribution for X and find

1. $EX, Var(X), E(2X^2 - 3)$

6. An urn contains 4 red balls and 2 blue balls. Two balls are selected without replacement.

1. What is the probability that they are both red?
2. What is the probability that a red ball is selected on the second draw?

7. Random variable S is a number of successes in 5 Bernouli trails with success probability $p = 0.25$. Please, find $P(S < 2)$.

8.The probability of winning in a certain state lottery is said to be about 5%. What is the probability that 10th ticket will be first winning?