Student: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Group: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Lecturer: A.S. Eremenko

**Homework 11**

1. The joint PMF of and is defined by:

1

a) ;

b) ;

c) ;

d) .

2. How can be obtained marginal PMFs of and from the joint PMF:

a) ;

1

b) ;

c) ;

d) ?

3. For any random variables and any scalars , we have the expected value rule:

1

a) ;

b) ;

c) ;

d) .

4. A joint probability density function is a nonnegative function that satisfies:

a) ;

1

b) for every subset of the two-dimensional plane;

c) where joint CDF;

d) if is the entire two-dimensional plane.

5. Conditioning one random variable on another can be defined by:

a) ;

1

b) ;

c) ;

d) .

6. Which from the listed below statements are true for independent random variables:

a) , for all , ;

1

b) , for all , ;

c) ;

d) .

7. Find the correct formula of covariance and correlation coefficient of two random variables and :

a) , and have nonzero variances;

1

b) ;

c) ;

d) .

**Problem 1**. Delay of data transfer from the node of customer access network is a discrete random variable. Two random variables and are delays from two nodes and have the following joint PMF:

|  |  |  |  |
| --- | --- | --- | --- |
|  | 0 | 1 | 5 |
| 1 | 0.1 | 0.2 | 0 |
| 3 | 0 | 0.3 | 0 |
| 4 | 0.1 | 0.2 | 0.1 |

Find numerical characteristics: , , , , and . Show graphically and .

8

*Solution*:

**Problem 2**. Two applications generate two flows of data. RV characterizes time between data units departures of the first flow with , and RV analogous time parameter for the second flow with . RVs and are independent from each other. Find joint PDF , and . Suppose that flow intensity dimension is .

*Solution*:

5

20