Student: ________________________________

Group: ________________________________

Lecturer: A.S. Eremenko

HOMEWORK 6

1. What is a random variable:

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a) a possible outcome;

b) the numerical value;

c) the experimental value;

d) a real-valued function of the experimental outcome?

2. A random variable is called discrete if:

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a) it can be conditioned on another random variable;

b) its range is finite or at most countably infinite;

c) the set of values that it can take is uncountably infinite;

d) it can be independent from an event of from another random variable.

3. A discrete random variable has an associated:

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a) PMF;

b) PDF;

c) function of random variable;

d) real-valued function.

4. If x is any possible value of X, the probability of the event $\{X = x\}$, consisting of all outcomes that give rise to a value of X equal to x, is:

a) the probability density;

b) the probability mass of x;

c) $p_X(x)$;

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d) the variance of X.

5. Which from the listed below properties are true for a probability density functions:

a) for any subset B of the real line $P(X \in B) = \int_B \ f_X(x)dx$;

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b) $\sum_x p_X(x) = 1$;

c) $\int_{-\infty}^{\infty} f_X(x)dx = 1$;

d) $P(a \leq X \leq b) = \int_a^b f_X(x)dx$?

6. What can be interpreted as the area under the graph of the PDF:

a) $P(X = a) = \int_a^a f_X(x)dx = 0$;

b) the probability that the value of X falls within an interval;

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c) $P(a \leq X \leq b) = \int_a^b f_X(x)dx$;

d) entire area under the graph of the PDF must be equal to 1?

7. What provides cumulative distribution function $F_X(x)$: 1

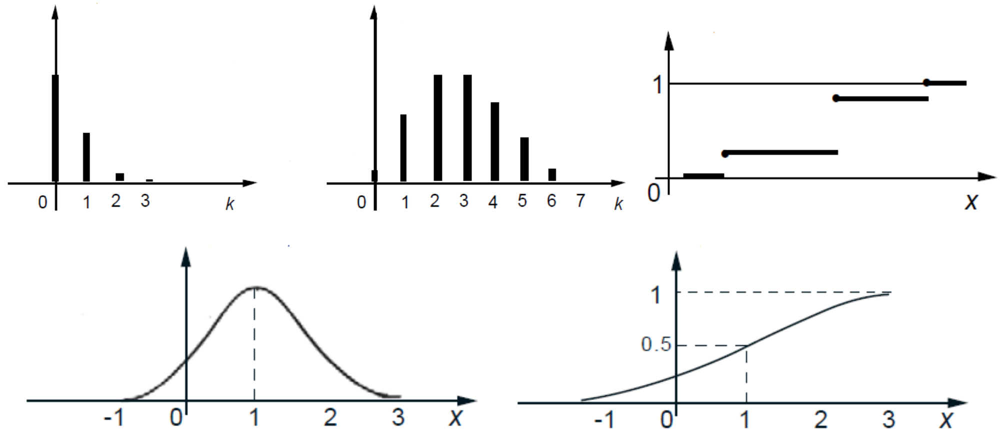
a) the probability $P(X = x)$;

b) the probability $P(X \le x)$;

c) probability mass per unit length;

d) area under the graph of the PDF.

8. Indicate y-axis on graphs and corresponded RV (continuous or discrete): 3



Problem 1. Show graphically PMF and corresponding CDF of discrete random variable X of number of failures of the router during the day, if:

$P(X = 0) = 0.05$, $P(X = 1) = 0.1$, $P(X = 2) = 0.5$, $P(X = 3) = 0.3$, $P(X = 4) = 0.05$. 5

Solution:

Problem 2. No failure operating time of some device has an exponential PDF:

$$f_X(x) = 0.01e^{-0.01t},\ t > 0, \text{ where } t \text{ – time in } hours.$$

Find the probability that device will operate without failures during 100 $hours$.

Solution:

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