Student: ______________________________

Group: ______________________________

Lecturer: A.S. Eremenko

HOMEWORK 7

1. What can be interpreted as a center of gravity of the random variable`s PMF:

1	

a) standard deviation;

b) skewness;

c) mean;

d) variance?

2. The second central moment is:

1	

a) standard deviation;

b) skewness;

c) mean;

d) variance.

3. A measure of dispersion of RV X that has the same units as X is:

1	

a) standard deviation;

b) skewness;

c) mean;

d) variance.

4. The expected value or mean of a continuous random variable X is defined by:

a) $E[X] = \int_{-\infty}^{\infty} g(x) f_X(x) dx$;

b) $E[X] = \sum_x x^n p_X(x)$;

c) $E[X] = \int_{-\infty}^{\infty} x f_X(x) dx$;

1	

d) $E[X] = \int_{-\infty}^{\infty} (X - E[X])^2 f_X(x) dx$.

5. The variance $\text{var}(X)$ of a continuous random variable X is defined by:

1	

a) $\text{var}(X) = E[(X - E[X])^2]$;

b) $\text{var}[CX] = C^2 \text{var}[X]$, where C constant;

c) $\text{var}(X) = \int_{-\infty}^{\infty} (X - E[X])^2 f_X(x) dx$;

d) $\text{var}(X) = E[X^2] - (E[X])^2$.

6. The value x at which its probability mass function takes its maximum value is:

a) the median of a discrete probability distribution;

1	

b) the mode of a discrete probability distribution;

c) the sample mean;

d) the excess kurtosis.

7. Which from the listed below statements are true:

1	

a) kurtosis is a measure of the "peakedness" of the probability distribution of a real-valued random variable;

b) if the mass of the distribution is concentrated on the right of the figure we have negative skew;

c) if the distribution is unimodal, then the $mean = median = mode$;

d) the median of a finite list of numbers can be found by arranging all the observations from lowest value to highest value and picking the middle one.

Problem 1. X is a random variable with $E(X) = 100$ and $\text{var}(X) = 15$. Find (a) $E(X^2)$; (b) $E(3X + 10)$; (c) $E(-X)$; (d) $\text{var}(-X)$; (e) $\sigma_X(-X)$.

3	

Solution:

Problem 2. Find expectation, variance and standard deviation of discrete RV 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 3. Let X be **uniformly** distributed on the interval $[0;\ 1]$. Find expectation and variance of X. Continuous uniform RV has a PDF:

$$f_X(x) = \begin{cases} \dfrac{1}{b-a} \ if \ a \le x \le b, \\ 0 \ otherwise. \end{cases}$$

Solution:

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