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METHODOLOGICAL FEATURES OF THE SUBMISSION BASIC STATISTICAL FUNCTIONS

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Abstract. *In this paper, the easy algorithms for calculating the expressions of statistical functions of Pearson, Student and Fisher without the use of the apparatus of special functions, as for simple cases with small degrees of freedom, and for greater degrees are showed. In these algorithms, the known mathematician of the differentiation and integration of continuous functions is known by the competitor.*

Keywords: *probability theory, mathematical statistics, algorithms, basic statistical functions of Pearson, Student and Fisher*

For qualitative mathematical preparation of students it is important to carefully and consistently describe the theoretical material so that in the minds of students a logical and continuous chain of understanding of theoretical problems of discipline and the principles of their solution from the beginning to the end of the course was formed.

In the teaching of "The theory of probability theory and mathematical statistics", in our opinion, there is a gap in such a chain in terms of determining the basic statistical functions of Pearson, Student and Fisher through the Euler gamma function. Neither the gamma-function, nor its properties, nor the means of its use, as a rule, are absent in the mathematical preparation of students. Meanwhile, it is easy to show the algorithms for calculating the expressions of these statistical functions without the use of the apparatus of special functions, as for simple cases

with small degrees of freedom, and for greater degrees. In these algorithms, the known mathematician of the differentiation and integration of continuous functions is known by the competitor.

So, for finding the formula of the Pearson distribution, we use the formula for the convolution of two densities χ^2. First, the convolution was applied to the degrees of freedom $k_1=1$ and $k_2=1$, which allowed to be determined χ^2 for k = 2. Then for the pair $k_1=1$ and $k_2=2$ we obtain χ^2 with degrees k = 3 and k = 4, and then, consistently, we match χ^2 with k, equal to 5, 6, 7, 8, and so on.

To find the density of the Student distribution, we use a somewhat more complicated computation procedure, since it is a function of the distribution of the particle density, and the density of the divisor must be calculated each time separately. Similarly, you can find the Fisher function.

To check the obtained results, they were compared with calculations using general formulas using the gamma function. The comparison is the complete correspondence of the results of the calculations.

Authors understand that the disadvantage of the proposed algorithm of computation is the dependence of each subsequent result from the performance of the previous one. The authors do not set themselves the task of replacing the existing optimal method of computation through the gamma-function. Only a pedagogical task is solved, which can promote better understanding by students of the mathematical apparatus of statistics.

The article, according to the authors, fills the gap in the educational process between the basic definitions of statistical functions and their complex formulas associated with the Euler gamma function.

The materials of work also expand the list of exercises and tasks for the section of mathematical statistics "Functions of a random argument", which contribute to a better assimilation of the theory.

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