

Description for the general public

In mathematics it often happens that an investigated object cannot be described by an explicit formula. Not because of our lack of skills, but because such a formula simply does not exist. A classical example is an antiderivative of the Gaussian density function, which cannot be expressed by elementary functions. Fortunately, it is often enough to find a good approximation of a given object. A separate question remains what does it mean a good approximation.

The main subject of this project are some special functions which are defined on high dimensional normed spaces, valued in real numbers. They are too complicated to be determined by an exact formula, however simple enough to be approximated by simpler (often computable) quantities. Moreover, the approximation can be two-sided, what means that the quotient of the function and the approximation can be bounded from above and below by a numerical constant. Such bounds are very useful both from the theoretical and practical point of view. They can be used to prove or deny various statements. Moreover, their accuracy forces them to describe behavior of the investigated object in details.

The main aim of this project is to investigate functions which are integral moments of deterministic multilinear forms evaluated on random vectors with independent coordinates. We treat them as functions of the coefficients of the multilinear forms. The secondary aim is to study expectations of suprema of some stochastic processes.