

Independent Constants and Some Gaussian Inequalities

Given d real valued random variables X_1, \dots, X_d , there are various ways to measure dependence structures among them, such as correlations, mixed moments, etc. In this talk, we define and study a new measure that captures the amount of dependence when it is compared with the “best” independent ones. To be more precise, we consider the best (largest constant α and smallest constant β) possible probability bounds

$$\alpha \prod_{i=1}^d P(W_i \in B_i) \leq P(\cap_{i=1}^d \{X_i \in B_i\}) \leq \beta \prod_{i=1}^d P(Y_i \in B_i)$$

for some real valued random variables W_i, Y_i , and all Borel sets $B_i, 1 \leq i \leq d$. The two-dimensional joint Gaussian case will be discussed in detail, together with several optimization and variation problems.