

Variance

1 Definition

The *variance* of a square-integrable real-valued random variable is the expectation of its square less its expectation squared.

1.1 Notation

Let (X, \mathcal{A}, μ) be a probability space and f be a random variable. We denote the variance of f by $\mathbf{var} f$. We defined it by

$$var f = E(f^2) - (E(f))^2.$$

2 Results

Proposition 1. If a random variable on a probability space is square integrable then it is integrable.

Proof. The L^p spaces are nested for finite measures.

Proposition 2. The variance of a square-integrable real-valued random variable is the expectation of the square of the difference between the random variable and its expectation.

Proof.

$$\operatorname{var} f = \operatorname{E}((f - \operatorname{E}(f))^2)$$