Properties

Expectation of a Linear Function

$$E[aX + b] = aE[X] + b$$

Expectation of a Sum of Random Variables

$$E[X_1 + \ldots + X_n] = E[X_1] + \ldots + E[X_n]$$

Expectation of an Affine Combination of Random Variables

$$E[a_1X_1 + \ldots + a_nX_n + b] = a_1E[X_1] + \ldots + a_nE[X_n] + b$$

Jensen's Inequality

Let g be a convex function and X a random variable,

$$E[g(X)] \geq g(E[X])$$

Expectation of a Product of Random Variables

Let $X_1, \ldots, X_n$ be independent random variables,

$$E\left[\prod_{i=1}^{n} X_i\right] = \prod_{i=1}^{n} E[X_i]$$