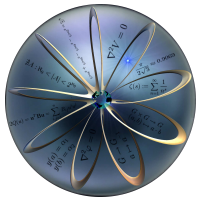

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estimator

Canonical name	Estimator
Date of creation	2013-03-22 14:52:22
Last modified on	2013-03-22 14:52:22
Owner	CWoo (3771)
Last modified by	CWoo (3771)
Numerical id	6
Author	CWoo (3771)
Entry type	Definition
Classification	msc 62A01
Defines	estimate

Let $X_1, X_2, \ldots, X_n$ be samples (with observations $X_i = x_i$) from a distribution with probability density function $f(X \mid \theta)$, where θ is a real-valued unknown `http://planetmath.org/StatisticalModel`parameter in f. Consider θ as a random variable and let $\tau(\theta)$ be its realization.

An *estimator* for θ is a statistic $\eta_\theta = \eta_\theta(X_1, X_2, \ldots, X_n)$ that is used to, loosely speaking, estimate $\tau(\theta)$. Any value $\eta_\theta(X_1 = x_1, X_2 = x_2, \ldots, X_n = x_n)$ of η_θ is called an *estimate* of $\tau(\theta)$.

Example. Let $X_1, X_2, \ldots, X_n$ be iid from a normal distribution $N(\mu, \sigma^2)$. Here the two parameters are the mean μ and the variance σ^2. The sample mean $\overline{X}$ is an estimator of μ, while the sample variance s^2 is an estimator of σ^2. In addition, sample median, sample mode, sample trimmed mean are all estimators of μ. The statistic defined by

$$\frac{1}{n-1}\sum_{i=1}^{n}(X_i - m)^2,$$

where m is a sample median, is another estimator of σ^2.