Statistics: Week 2–3

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Random Variable

- Variable vs. Random Variable

- Characterization: probability mass function (pmf), probability density function (pdf)

- pdf and pmf as a limiting histogram

- pdf $\neq$ probability, but can be used to calculate probability

- Sample Space, σ-field

Law of Large Numbers

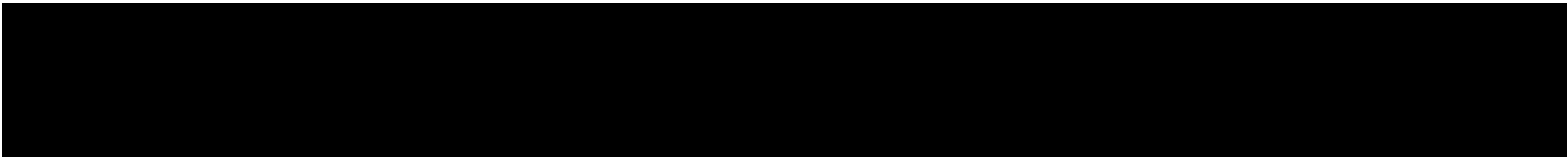Long-run frequency interpretation of expectation and probability

Theorem 1 (SLLN). *Let $X_1, X_2, \ldots$ be independent and identically distributed random variables with mean $EX_i =$ then with probability one, $S_n/n = \frac{1}{n} \sum_{i=1}^{n} X_i$ converges to   .*

Probabilistic interpretation vs. Statistical interpretation of LLN

Basic Rules

Let X, Y are two random variables with finite variance (thus finite mean) and a, b two real numbers.

- $E(a + Y) = a(X) + E(Y)$