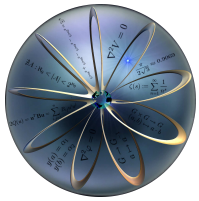

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Glivenko-Cantelli lemma

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Let $X_1, \ldots, X_n$ be iid as X with (unknown) distribution function F. Let ω be the outcome and $F_n(x, \omega)$ be the empirical distribution function based on observations $X_1(\omega), \ldots, X_n(\omega)$. Then, as $n \to \infty$,

$$\sup_{-\infty<x<\infty} |F_n(x, \omega) - F(x)| \to 0 \text{ a.s.},$$

where a.s. means almost surely.