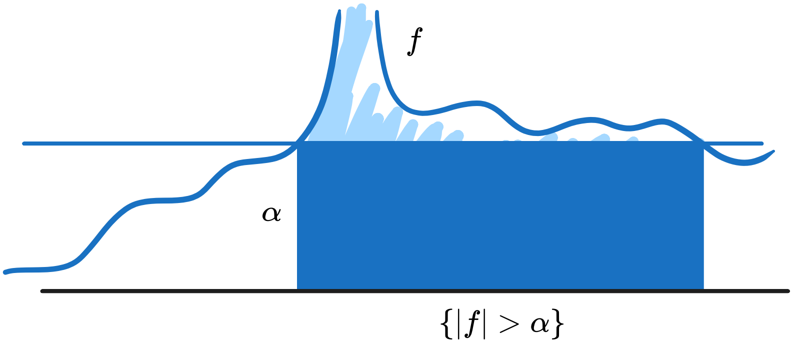
Info

This note found here
as a part of a collection
is written (completely with human hands) by Rupadarshi Ray,
created on May 25, 2026 12:15:19 AM,
and was last modified on June 10, 2026 8:40:48 PM.

Chebyshev's inequality



(Chebyshev's inequality) Let $f \in L^p(\mathbb{R}^d), p \in (0, \infty)$. Then for any $\alpha > 0$

$$m\{|f| > \alpha\} \leq \frac{\|f\|_p^p}{\alpha^p}$$

$$\begin{aligned} \|f\|_p^p &= \int_{\mathbb{R}^d} |f|^p \\ &\geq \int_{\{|f|>\alpha\}} |f|^p \\ &\geq \alpha^p m\{|f| > \alpha\} \end{aligned}$$

■

bounded decomposition

Let $f \in L^1(\mathbb{R}^d)$ then

$$f = f1_{\{|f| \leq t\}} + f1_{\{|f| > t\}}$$

Here, we have the *bounded part* of f

$$\begin{aligned}\left\|f1_{\{|f|\le t\}}\right\|_1 &= \int_{\{|f|\le t\}} |f| \\ &\le \|f\|_1 \\ \text{and } \left\|f1_{\{|f|\le t\}}\right\|_\infty &\le t\end{aligned}$$

and the *unbounded part*

$$\left\|f1_{\{|f|>t\}}\right\|_1 = \int_{\{|f|>t\}} |f| \le \|f\|_1$$

and

$$m(\operatorname{supp} f1_{\{|f|>t\}}) = m(\{|f|>t\}) \le \frac{1}{t}\|f\|_1$$

Current note has 0 direct children and 0 total descendants.

- stamp stamp
  - Rf subobjects of and functions on $\mathbb{R}^n, T^n, S^n, \mathbb{C}^n$
    - Lmeas Lebesgue measurable subsets of and functions on $\mathbb{R}^n, T^n, S^n$
      - decom bd Chebyshev's inequality

And it has 15 siblings.

- stamp stamp
  - Rf subobjects of and functions on $\mathbb{R}^n, T^n, S^n, \mathbb{C}^n$
    - Lmeas Lebesgue measurable subsets of and functions on $\mathbb{R}^n, T^n, S^n$
      - BMO Functions with uniformly bounded mean oscillations on cubes
      - decom bd Chebyshev's inequality
      - decom CZ Calderon-Zygmund decomposition
      - density Lebesgue density of measurable sets
      - DMO Functions with uniformly bounded mean oscillations on dyadic cubes
      - End int Volterra operator $\int_{[0,-]} : L^1_{\text{loc}}[0,1) \to \mathcal{C}[0,1)$
      - f Measurable functions on $\mathbb{R}^n$
      - f quant (ϵ, n)-measurable function
      - int Integrability and integral of measurable functions on $\mathbb{R}^n$
      - int HL Hardy-Littlewood maximal functions of $L^1_{\text{loc}}(\mathbb{R}^n)$
      - int mean Lebesgue averaging and differentiation
      - int monotone Integrals of a monotonically converging sequence of functions

- int undergraph Lebesgue integral from measure of undergraph
- Lorentz $L^{p,q}$
- unit mass $\mathrm{E}([0,1]) = \mathrm{E}(0,1), \mathrm{E}([-\pi,\pi]) = \mathrm{E}(S^1)$