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[0, 1]-measure spaces

L^p -spaces

Proposition: Let (X, μ) be a measure space such that $\mu(X) < \infty$. We have

$$0 < p < q \leq \infty \implies L^p(X, \mu) \leq L^q(X, \mu)$$
$$\text{and } \|f\|_p \leq \|f\|_q \mu(X)^{\frac{1}{p} - \frac{1}{q}}$$

Thus, in particular

- for $\mu(X) = 1$

$$L^1 \geq L^2 \geq \dots \geq L^\infty$$
$$\| \cdot \|_1 \leq \| \cdot \|_2 \leq \dots \leq \| \cdot \|_\infty$$

- the inclusions

$$\iota : (L^p(X, \mu), \| \cdot \|_p) \hookrightarrow (L^q(X, \mu), \| \cdot \|_q)$$

are continuous(?) for $0 < p < q < \infty$ and has a dense image.

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And it has 7 siblings.

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