CHECKLIST FOR MAT4410

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Product of measure spaces; given measure spaces $(X, \mathcal{M}, \mu)$, $(Y, \mathcal{N}, \nu)$:

(1) what do you start with when defining the measurable sets in $X \times Y$?
(2) what operation do you allow on those?
(3) what condition do you want on μ and ν when you talk about the product measure $\mu \otimes \nu$?
(4) give some illustrating examples of product measures.

Relation to double integral

(1) how do you model double integral by product measures?
(2) when can you switch the order of double integral?

Banach spaces

(1) give illustrating examples of Banach spaces among function spaces and sequence spaces.
(2) how do you relate Hölder's inequality to continuity of functionals?
(3) what does the L^p-L^q duality say?
(4) when $p = q = 2$, reduce it to a general claim about Hilbert spaces.
(5) how do you distinguish topology induced by 1-norm, 2-norm, ∞-norm on $C_c(\mathbb{R})$?

Integral presentations

(1) explain Lebesgues and Jordan decompositions with illustrating examples.
(2) when can you write $\nu(A) = \int_A \rho d\mu$?
(3) when can you make sense of $\phi(f) = \int f d\mu$?

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