

Preparation for sample PT 2023 ETHZ exam

- * The sample exam will contain one or several of the following questions:
 - Any one of the “Exercise covered during the exercise class” from Sheets 1-7
 - State the Dynkin Lemma.
 - Give an example of a Dynkin system which is not a σ -field (and explain why it is a Dynkin system and not a σ -field).
 - State and prove the Borel-Cantelli Lemmas.
 - Give the definition of the law of a random variable.
 - Explain why two real random variables have same cumulative distribution function if and only if they have same law.
 - State the transfer theorem.
 - State and prove the transfer theorem.
 - Show that if X and Y are two independent real random variables with densities then $X + Y$ has a density.
 - Show that if X and Y are two independent real random variables with densities then $\mathbb{P}(X = Y) = 0$.
 - State and prove the Cauchy-Schwarz inequality for a random variable.
 - State the Kolmogorov two-series theorem.
 - State and prove Kolmogorov’s three-series theorem (using Kolmogorov’s two-series theorem without proof).
 - State the strong law of large numbers.

⚠ **WARNING.** Be sure to properly state all the required assumptions when asked to state a result.