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Financial Mathematics 1 - Spring term 2015

Exercise sheet no.1 (12.3.2015)

Exercise 1: Show that the hypergeometric distribution converges against the binomial distribution with parameters n, p as $N, K \to \infty$ with $p = \frac{K}{N}$ constant (cf. lecture 2.3 (ii)).

Exercise 2: Calculate the expectation of a discrete random variable that has:

(i) binomial distribution with parameters n and p.

(ii) Poisson distribution with parameter $\lambda > 0$.

Exercise 3: Show that the Borel σ-algebra on $\mathbb{R}$ is generated by the collection of sets $\{(-\infty, q) \,|\, q \in \mathbb{Q}\}$. Hint: You may use that any open set in $\mathbb{R}$ is the union of countably many open and bounded intervals).

Exercise 4: Let $(\Omega, \mathcal{F})$ and $(\tilde{\Omega}, \tilde{\mathcal{F}})$ be measurable spaces and $T : \Omega \to \tilde{\Omega}$ be a map. Show that $\{\tilde{A} \in \mathcal{P}(\tilde{\Omega}) \,|\, T^{-1}(\tilde{A}) \in \mathcal{F}\}$ is a σ-algebra in $\tilde{\Omega}$.

Please drop the solutions into the homework box for the lecture until 19.3.2015, 6 pm