Financial derivatives
”Fundamentals” part of the oral exam

One question on the oral exam comes from the "fundamentals", a satisfactory answer is necessary for passing the exam.

- Definitions of a Wiener process, a Brownian motion and a geometrical Brownian motion.
- Ito lemma: statement of the one-dimensional Ito lemma, its intuitive proof, application - finding explicit solution to $dS = \mu S dt + \sigma S dw$ where μ, σ are constants and w is a Wiener process.
- Derivation of the Black-Scholes partial differential equation using Black-Scholes approach.
- Historical volatility (definition, derivation of the estimator) and implied volatility (definition, existence and uniqueness - the Black-Scholes formula is provided).
- Derivation of the delta for call and put options in the Black-Scholes framework (the Black-Scholes formula is provided). The concept of delta hedging.
- Numerical methods for the heat equation - derivaton of implicit and explicit schemes.