Mathematical Finance Winter term 2023/2024

S. Christensen
P. Le Borne, B. Schroeter, B. Schultz

Sheet QF11P

Mathematical Finance: QF

In-Tutorial exercises (for discussion on Tuesday, 23/01/2024)

In-Tutorial Exercise 1. Let $(x_1, y_1), \ldots, (x_n, y_n) \in \mathbb{R}^2$ be pairs of values. We want to approximate the y_i via a affine-linear function f of the x_i, i.e. we want to find coefficients a and b such that

$$y_i \approx f(x_i) = bx_i + a.$$

To this end we consider the error functional

$$Q : \mathbb{R}^2 \to \mathbb{R}, (a, b) \mapsto \frac{1}{n} \sum_{i=1}^{n} (y_i - f(x_i))^2.$$

Find the coefficients a^* and b^* which minimize the functional Q assuming that the x_i are not constant.

In-Tutorial Exercise 2. Let W be the standard Brownian Motion and let $X_t = W_t^2$. Write X in the form of an Itō process using Itō's Formula.