Mathematical Finance: QF
In-Tutorial exercises (for discussion on Tuesday, 30/01/2024)

In-Tutorial Exercise 1. Let W denote the standard Brownian Motion. Further, define the processes

$$X = \sqrt{W} \qquad \text{and} \qquad Y = 4W^2.$$

1. Determine the Itō process representation of X and Y.

2. Calculate the covariation process of X and Y.

In-Tutorial Exercise 2. Let $X_1, X_2, \ldots$ be a sequence of independent random variables with the expected value $E(X_n) = \mu$ for every n. Show, that

$$S_n = \sum_{i=1}^{n} X_i$$

is a martingale w.r.t. to the filtration $(\mathcal{F}_n)_n$ generated by $X = (X_n)_n$ if $\mu = 0$.