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Discrete-Time Mathematical Finance

Assignment sheet 10

Exercise 1   (4 points)

Prove Lemma 4.3.1 of the lecture.

Exercise 2   (4 points)

Consider the CRR-model with the parametrization from Chapter 4.3 of the lecture and $r = 0$. Show that

$$\frac{u_f(t-1,x) - u_f(t,x)}{\frac{T}{K}} = \frac{1}{2}x^2\sigma^2 \cdot \frac{u_f(t, x(1+\sigma\sqrt{\frac{T}{K}})) - 2u_f(t,x) + u_f(t, x(1-\sigma\sqrt{\frac{T}{K}}))}{x^2\sigma^2\frac{T}{K}}$$

holds.

How can this expression be interpreted as an approximation scheme for a partial differential equation (PDE)? Which PDE can be associated to this scheme?