Mathematical Finance Winter term 2023/2024
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Mathematical Finance: QF

In-Tutorial exercises (for discussion on Tuesday, 09/01/2024)

In-Tutorial Exercise 1. We consider a market modelled by a binomial model with time horizon $N = 2$ and the parameters $S_0^0 = S_0^1 = 100$, $\tilde{r} = 0.04$, $u = 1.2$, $d = 0.8$ and $p = 0.7$.

(a) Calculate the value of every node for $S = (S^0, S^1)$ and draw the tree.

In this market model we first consider a European put option with strike price $K = 100$ and maturity $N = 2$.

(b) Determine the fair price process S^2 for the European put option.

(c) Find a hedging strategy for the European put option.

Now we want to consider an American put option with the same strike and maturity.

(d) Determine the Snell envelope U of $\hat{S}^1$ and find the optimal stopping time τ^*.

(e) Determine the fair price process S^3 for the American put option.

(f) Find a hedging strategy for the American put option assuming the holder of that put option act rationally.