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LV-Nr. 425093

Computational Finance and FinTech – Problem Set 5

Exercise 1. Write a function that calculates the price of a contingent claim in a binomial tree. The function should return the option value at each node in the tree.

Exercise 2. Write a function that calculates the price of an option in the binomial tree model using risk-neutral expectation.
(Hint: Import the package `scipy.stats`.)

Exercise 3. Assume a CRR model with annual price jumps. Today's stock price is $S_0 = 100$ and assume an annualised volatility of 33%. Let $r = 5\%$ p.a.
Determine the price of a call option with strike $K = 105$ and maturity $T = 3$.

Exercise 4. Create a function that computes the price of a call option in the CRR model. Make the parameter Δt small, while keeping all other parameters fixed and show that the call price converges to the Black-Scholes price.

Exercise 5. Create a plot of the payoff of a call option as a function of the stock price S_T at expiry and the corresponding call option price.
The parameters are: $S_0 = 100$, $\sigma = 0.25$, $r = 0.05$, $T = 1$, $K = 100$.