

2.4 Exercises

1. Consider a single period CRR model with $S_0 = \$50$, $S_1 = \$100$ or $\$25$, $r = 0.25$.

- (a) Find the arbitrage free price of a European call option for one share of stock where the strike price is $K = \$50$ and the exercise time $T = 1$.
- (b) Find a hedging strategy that replicates the value of the option described in (a).
- (c) Suppose the option in (a) is initially priced at \$1 above the arbitrage free price. Describe a strategy (for trading in stock, bond and the option) that is an arbitrage.
- (d) What is the arbitrage free price for a put option with the same strike price and exercise time as the call option described in (a)?

2. Consider a CRR model with $T = 2$, $S_0 = \$50$, $S_1 = \$100$ or $S_1 = \$25$, and an associated European call option with strike price $K = \$40$ and exercise time $T = 2$. Assume that the risk free interest rate is $r = 0.1$.

- (a) Draw the binomial tree and compute the arbitrage free price of the European call option at time zero.
- (b) Determine an explicit hedging strategy for this option.
- (c) (Optional) If you are ambitious, try to automate this pricing procedure in a computer program where T, S_0, u, d, K are variables.

3. (Computer lab exercise) Exercise 1 on page 76 of class handout.