KTH Mathematics

Exercise 1 in SF2701 Financial Mathematics, basic course, spring 2014.

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1. (a) Compute the price of a European call option with strike price $K = 125$ kr and exercise time $T = 2$ years using a two period binomial tree and the parameters $s_0 = 100$, $u = 1.5$, $d = 0.5$, $r = 0$, and $p = 0.75$.

(b) Find a replicating portfolio for the option.

2. (a) In the binomial tree below the price of a binary asset-or-nothing option with expiry in two years and payoff

$$X = \begin{cases} S(2) & \text{if } S(2) > 120, \\ 0 & \text{otherwise,} \end{cases}$$

has been computed using the parameters $s_0 = 80$, $u = 1.5$, $d = 0.5$, $r = 0$, and $p = 0.55$. In the definition of the contract function $S(2)$ denotes the stock price at time $t = 2$.

(b) Find a replicating portfolio for the derivative.

3. (a) Compute the price of an *American put option* with strike price $K = 100$ kr and exercise date $T = 2$ years using a two period binomial tree and parameters $s_0 = 100$, $u = 1.4$, $d = 0.8$, $r = 10\%$, and $p = 0.75$.

(b) Find a replicating portfolio for the option.

4. 12.16 from Hull