Fin. Math. Assignment 4

1. The price movement of a stock is given by the following binomial tree.

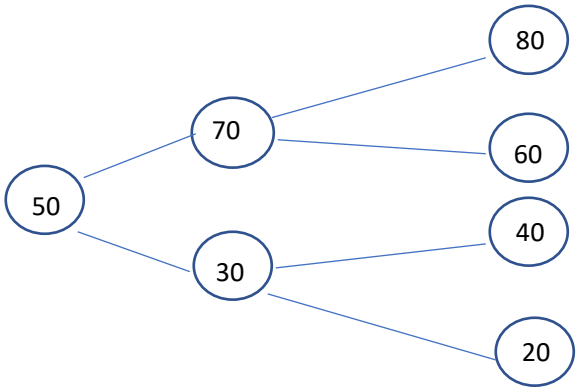


Figure 1: stock price

The interest rate is zero. Let X be a digital put option with maturity at tick-time 2 and strike price 55. The payoff is 10 if the stock price at tick-time 2 is greater than or equal to the strike price. What is the fair price for X?

2. The price of a stock follows the binomial tree shown in Figure 1 and interest rate $\mathrm{r} = 0$. Let X_1 be a compound put-on-put option with maturity at tick-time 1 and strike price 10. The underlying call option X_2 with maturity at tick-time 2 and strike price 55. What is the fair price for X?

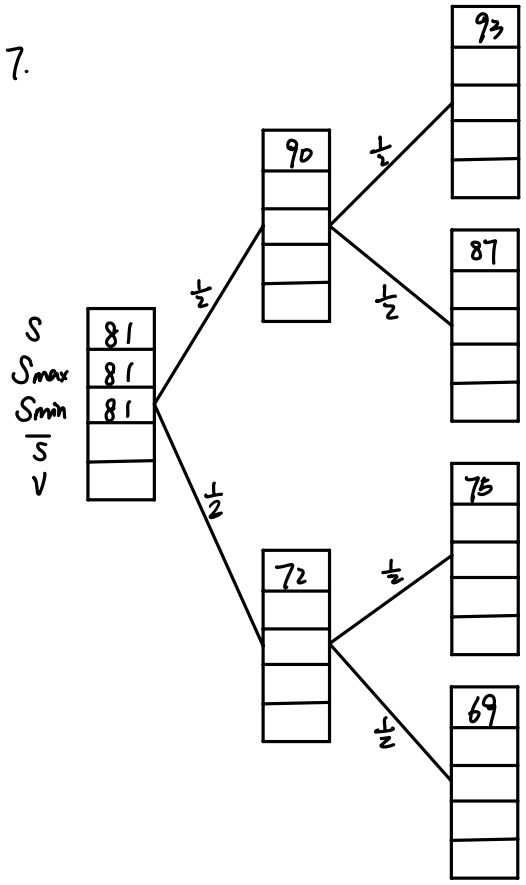
3. The price of a stock follows the binomial tree shown in Figure 1 and interest rate $\mathrm{r} = 0$. Let X be a chooser option with maturity at tick-time 1. The payoff of this chooser option is $\mathrm{F(S)} = \max\{\mathrm{C}(S_{T_1}, T_1, T_2, K_1) - K_3, \mathrm{P}(S_{T_1}, T_1, T_2, K_2) - K_4, 0\}$ with strike prices $K_1 = 55, K_2 = 50, K_3 = 5, K_4 = 5$. What is the fair price for X?

4. The price of a stock follows the binomial tree shown in Figure 1 and interest rate $\mathrm{r} = 0$. Let X be a down-and-out call barrier option with maturity at tick-time 2 and strike price 55. The barrier is at 35. What is the fair price for X?

5. The price of a stock follows the binomial tree shown in Figure 1 and interest rate $\mathrm{r} = 0$. Let X be a down-and-in call barrier option with maturity at tick-time 2 and strike price 55. The barrier is at 35. What is the fair price for X?

6. The price of a stock follows the binomial tree shown in Figure 1 with interest rate $r = 0$. The stock does not pay dividend. What is the price of an Asian (arithmetic) average-rate call option with strike price 30?

7.



(1) Lookback rate put option : $F(T,S) = \max\{0, S_0 - S_{min}\}$

(2) Lookback strike call option : $F(T,S) = \max\{0, S - S_{min}\}$

(3) lookback rate down-and-out call option : $\max\{0, S_{max} - 69\}$ barrier = 85