Sample Questions

1. Consider the one-period binomial model for a stock price, with the up-move factor u and down-move factor d = 1/u. The time interval for the period is denoted by Δt and the risk-free interest rate is assumed to be r with simple compounding. The volatility σ of the stock is defined through the following relation

$$\operatorname{Var}\left(\frac{S_1 - S_0}{S_0}\right) = \sigma^2 \Delta t$$

Derive a formula for σ in terms of u, r, and Δt .

- 2. Assume that X stock price is at \$50 and we would like to price an European call on X stock with K =\$52 and maturity T = 0.5. The volatility of X stock is assumed to be 20%, and the interest rate is taken to be zero. Use a two-period binomial model to price this call. To simplify calculations, we can approximate $\exp(\pm \sigma \sqrt{\Delta t})$ by $1 \pm \sigma \sqrt{\Delta t}$.
- 3. In the above model, price an European put option with the same K and T, but a σ value of 40%.
- 4. A forward contract that obligates you to purchase 100 shares of the X stock for a price \$52 per share at T = 0.5 is presented to you. Use the two-period binomial model in Problems 2 to price this contract. If the value is negative, you are supposed to collect that amount when you sign this contract. Use a no-arbitrage argument to justify your answer.