Assignment 8

Due on 2019-09-25, 23:59 IST.

5 point

In a three-period binomial model, if \( E(S_3 | S_0 = s) = g(s) \), then the number of possible non-zero values of the function \( g(s) \) equals:

No, the grader is incorrect.

Question 5

5 point

State whether the following statement is TRUE or FALSE:
In an \( N \)-period binomial model, the process \( \{ Y_n, 0 \leq n \leq N \} \), where \( Y_n = S_{n+1} - S_n \), is adopted to the filtration \( \{ F_n \}_{n=0}^{N} \), where \( F_n \) is the \( \sigma \)-field containing the sets determined by the first \( n \) times.

TRUE

FALSE

No, the grader is incorrect.

Question 6

5 point

Consider an \( N \)-period binomial model setup with the filtration \( \{ F_n \}_{n=0}^{N} \), where \( F_n \) is the \( \sigma \)-field containing the sets determined by the first \( n \) times. Then which of the following is \( n \) not always true?

(A) \( E(S_3 | F_2) \neq E(S_3 | F_1) \)

(B) \( E(E(S_3 | F_2) | F_2) = E(S_3 | F_2) \)

(C) \( E(E(S_3 | F_2) | F_2) = E(S_3 | F_2) \)

(D) \( E(E(S_3 | F_2) | F_2) = E(S_3) \)

No, the grader is incorrect.

Question 7

5 point

State whether the following statement is TRUE or FALSE:
In an \( N \)-period binomial model setup, the stock price process \( \{ S_n, 0 \leq n \leq N \} \) is both a martingale and a Markov process.

TRUE

FALSE

No, the grader is incorrect.

Question 8

2 points

Which of the following is always true for discrete-time stochastic processes?

(A) Every martingale is both a submartingale and a supermartingale.

(B) A process which is a submartingale is also a martingale.

(C) If \( \{ M_n \}_{n=0}^{N} \) is a martingale and \( \phi(s) \) is a convex function, then \( E(\phi(M_n)) \) is an increasing sequence.

(D) Given a random variable \( Z \) with \( E(Z) < \infty \) and given a filtration \( \{ F_n \}_{n=0}^{N} \), the process \( \{ Z_n \} \) defined by \( Z_n = E(Z | F_n) \) is Radon-Nikodym derivative process.

No, the grader is incorrect.

Question 9

5 point

State whether the following statement is TRUE or FALSE:
In an \( N \)-period binomial model setup, the no-arbitrage price \( V_0 \) at time \( n \) of a derivative with payoff \( V_n = \max(S_n - S_0, 0) \) can be written as \( V_0 = h(S_0) \) for some real valued function \( h \).

TRUE

FALSE

No, the grader is incorrect.

Question 10

5 point

Which of the following is always true in an \( N \)-period binomial model setup?

(A) The risk-neutral probability measure is unique.

(B) The expectation of the random variable \( S_n \) under the real-world probability measure is always greater than or equal to the expectation of \( S_n \) under the risk-neutral measure.

(C) The initial price of an American option and an American option with the same payoff function is the same if the payoff functions are path-independent.

No, the grader is incorrect.

Question 11

2 points

In a three-period binomial model with parameters \( n = 1, d = 0.96, r = 0.03 \) and \( S_0 = 00 \), the initial price of an American put option that expires at time three and has a strike price of 62 equals:

No, the grader is incorrect.

Question 12