

Unit 9 - Week 7: Risk-Neutral Pricing in Discrete-Time (Part 1)

Course outline

How to access the portal?

Week 0

Week 1: Introduction to Financial Markets and Instruments

Week 2: Time Value of Money and Riskfree Assets

Week 3: Modern Portfolio Theory (Part 1)

Week 4: Modern Portfolio Theory (Part 2)

Week 5: Fundamentals of Derivatives

Week 6: Derivative pricing by replication in binomial model

Week 7: Risk-Neutral Pricing in Discrete-Time (Part 1)

Quiz : Assignment 7

Lec 19: Discrete Probability Spaces

Lec 20: Filtrations and Conditional Expectations

Lec 21: Properties of Conditional Expectations

Feedback Form

Solution: Assignment 7

Week 8: Risk-Neutral Pricing in Discrete-Time (Part 2)

Week 9: Introductory Stochastic Calculus (Part 1)

Week 10: Introductory Stochastic Calculus (Part 2)

Week 11: Risk-Neutral Pricing in Continuous-Time (Part 1)

Week 12: Risk-Neutral Pricing in Continuous-Time (Part 2)

Text Transcripts

Live Session

Assignment 7

The due date for submitting this assignment has passed. As per our records you have not submitted this assignment.

Due on 2019-09-18, 23:59 IST.

1) Let (Ω, \mathcal{F}, P) be a discrete probability space. Then which of the following is/are not always true? 2 points

(A) $P\left(\bigcup_{n=1}^{99} A_n\right) = \sum_{n=1}^{99} P(A_n)$, for all $A_1, A_2, \dots, A_{99} \in \mathcal{F}$.

(B) Any real valued function defined on Ω is a random variable.

(C) For any random variable X , the expectation of X is finite.

(D) For any two random variables X and Y , we have $E(XY) = E(X)E(Y)$.

No, the answer is incorrect.

Score: 0

Accepted Answers:

(A) $P\left(\bigcup_{n=1}^{99} A_n\right) = \sum_{n=1}^{99} P(A_n)$, for all $A_1, A_2, \dots, A_{99} \in \mathcal{F}$.

(B) Any real valued function defined on Ω is a random variable.

(C) For any random variable X , the expectation of X is finite.

(D) For any two random variables X and Y , we have $E(XY) = E(X)E(Y)$.

2) Let a probability space be described by $\Omega = \{1, 2, 3, 4, 5\}$, $\mathcal{F} = \mathcal{P}(\Omega)$ and $P(1) = P(3) = P(5) = a$, $P(2) = P(4) = b$. Let X be a random variable defined by $X(\omega) = \omega^2, \forall \omega \in \Omega$. If $E(X) = 65/6$, then the value of $6(a + b)$ equals:

No, the answer is incorrect.

Score: 0

Accepted Answers:

(Type: Numeric) 2.5

3) Let $\Omega = \{-2, -1, 0, 1, 3\}$ and $\mathcal{F} = \mathcal{P}(\Omega)$. Let X be a random variable defined on (Ω, \mathcal{F}) by $X(\omega) = \omega^4, \forall \omega \in \Omega$. Then, the number of elements in the σ -field $\sigma(X)$ equals:

No, the answer is incorrect.

Score: 0

Accepted Answers:

(Type: Numeric) 16

4) Let (Ω, \mathcal{F}, P) be a discrete probability space and let $\mathcal{G} \subseteq \mathcal{F}$ be a σ -field which is countably generated by the sets B_1, B_2, \dots such that $B_i \cap B_j = \emptyset, i \neq j$ and $\cup_i B_i = \Omega$. Now, state whether the following statement is TRUE or FALSE:

If X is a \mathcal{G} -measurable random variable, then X takes constant but different values on each of the sets B_i .

(A) True

(B) False

No, the answer is incorrect.

Score: 0

Accepted Answers:

(B) False

5) In the binomial asset pricing model setup, where S_n denotes the stock price at time n , the number of atoms for the σ -field $\sigma(S_1, S_2)$ equals:

No, the answer is incorrect.

Score: 0

Accepted Answers:

(Type: Numeric) 4

6) Let (Ω, \mathcal{F}, P) be a discrete probability space and let $\mathcal{G} \subseteq \mathcal{F}$ be a σ -field. With I_A denoting the indicator function of A , and for $A, B \in \mathcal{G}$, which of the following is/are always true? 2 points

(A) $E(I_A|\mathcal{G})E(I_B|\mathcal{G}) = E(I_{A \cap B}|\mathcal{G})$

(B) $I_A + I_B = I_{A \cup B}$

(C) $I_A I_B = I_{A \cap B}$

(D) $E[E(I_A|\mathcal{G})] = P(A)$

No, the answer is incorrect.

Score: 0

Accepted Answers:

(C) $I_A I_B = I_{A \cap B}$

(D) $E[E(I_A|\mathcal{G})] = P(A)$

7) Let (Ω, \mathcal{F}, P) be a discrete probability space and let $\mathcal{G} \subseteq \mathcal{F}$ be a σ -field which is countably generated by the sets B_1, B_2, \dots such that $B_i \cap B_j = \emptyset, i \neq j$ and $\cup_i B_i = \Omega$. Now, state whether the following statement is TRUE or FALSE:

For any random variable Z defined on (Ω, \mathcal{G}) , we have $E(ZI_A) = E(XI_A)$ whenever $A \in \mathcal{G}$.

(A) True

(B) False

No, the answer is incorrect.

Score: 0

Accepted Answers:

(B) False

8) State whether the following statement is TRUE or FALSE:

In the binomial model setup, if \mathcal{F}_k denote the σ -field containing the sets determined by the first k tosses, then \mathcal{F}_k always contains 2^k elements.

(A) True

(B) False

No, the answer is incorrect.

Score: 0

Accepted Answers:

(B) False

1 point

1 point

1 point

1 point

1 point

2 points

1 point

1 point