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

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 $(\Omega, \mathcal{F}, P)$ 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 $A_1, A_2, \ldots, A_{99} \in \mathcal{F}$.

(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 $A_1, A_2, \ldots, A_{99} \in \mathcal{F}$.
(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

1 point

3) Let $\Omega = \{-2, -1, 0, 1, 3\}$ and $\mathcal{F} = \mathcal{P}(\Omega)$. Let X be a random variable defined on $(\Omega, \mathcal{F})$ 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

1 point

4) Let $(\Omega, \mathcal{F}, P)$ be a discrete probability space and let $\mathcal{G} \subseteq \mathcal{F}$ be a σ-field which is countably generated by the sets $B_1, B_2, \ldots$ such that $B_i \cap B_j = \phi, i \neq j$ 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. *1 point*

(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

1 point

6) Let $(\Omega, \mathcal{F}, P)$ 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 $(\Omega, \mathcal{F}, P)$ be a discrete probability space and let $\mathcal{G} \subseteq \mathcal{F}$ be a σ-field which is countably generated by the sets $B_1, B_2, \ldots$ such that $B_i \cap B_j = \phi, i \neq j$ and $\cup_i B_i = \Omega$. Now, state whether the following statement is TRUE or FALSE:
For any random variable Z defined on $(\Omega, \mathcal{G})$, we have $E(ZI_A) = E(XI_A)$ whenever $A \in \mathcal{G}$. *1 point*

(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. *1 point*

(A) True
(B) False

No, the answer is incorrect.
Score: 0
Accepted Answers:
(B) False