Unit 3 - Week 1

Course outline

Assignment 1

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

Due on 2020-02-12, 23:59 IST.

Instructions
1.$1_A(x)$ denotes the indicator function of the set A, i.e., $1_A(x) = 1$ if and only if $x \in A$.
2.The measure m denotes the Lebesgue measure.
3.For a finite subset A of real numbers, the distribution UA assigns an identical probability to each member of A, i.e., each member is equally likely.

1) Let $X : [0, 1] \to \mathbb{R}$ given by $X(\omega) = \omega$. What is $\sigma(X)$, the smallest σ algebra wrt which X is measurable? *1 point*

- Set of all Lebesgue measurable subsets of [0, 1]
- Set of all Lebesgue measurable subsets of $\mathbb{R}$
- Set of all Borel measurable subsets of [0, 1]
- Set of all Borel measurable subsets of $\mathbb{R}$

No, the answer is incorrect.
Score: 0
Accepted Answers:
Set of all Lebesgue measurable subsets of $\mathbb{R}$

2) Let $([0,1], \mathcal{B}_{[0,1]}, m)$ be a probability space and $X(\omega) = \omega 1_{[0,1/2]}(\omega)$. Which of the following are measurable w.r.t. $\sigma(X)$? *0 points*

- $Y(\omega) = \omega \ \forall \omega \in [0,1]$
- $Y(\omega) = 50 \ \forall \omega \in [0,1]$
- $Y(\omega) = \omega - X(\omega) \ \forall \omega \in [0,1]$
- $Y(\omega) = \min(1/2, \omega) \ \forall \omega \in [0,1]$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$Y(\omega) = 50 \ \forall \omega \in [0,1]$
$Y(\omega) = \min(1/2, \omega) \ \forall \omega \in [0,1]$

3) Let $([0,1], \mathcal{B}_{[0,1]}, m)$ be the given probability space where two independent random variables X and Y are defined such that both take values only 0 and 1 with identical positive probabilities. Which are correct? *1 point*

- X and Y can be chosen so that $P(XY = 0) = 1$
- $E(XY) = EXEY$
- $E(f(X)g(Y)) = E(f(X))E(g(Y))$ for any pair of bounded continuous functions f and g
- $E(X^Y) = 1$, where $0^0 := 1$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$E(XY) = EXEY$
$E(f(X)g(Y)) = E(f(X))E(g(Y))$ *for any pair of bounded continuous functions* f *and* g

Let $X \sim U\{1,2,3,4,5,6\}$, $Y = 2\lceil \frac{X}{2} \rceil$ where $\lceil x \rceil$ denotes the smallest greater integer. Find the value of

4) $E[X|Y = 2] = ?$

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Numeric) 1.50

1 point

5) $E[X|Y = 4] = ?$

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Numeric) 3.50

1 point

6) $E[X|Y = 6] = ?$

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Numeric) 5.50

1 point

7) $E(E[X|Y]) = ?$

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Numeric) 3.50

1 point

8) Let X be a random variable defined on $([0,1], \mathcal{B}_{[0,1]}, m)$ such that $X \sim U\{1,2,3,4,5,6\}$. Then what is the cardinality of $\sigma(X)$? *1 point*

- 6
- 8
- 2^6
- None of the above

No, the answer is incorrect.
Score: 0
Accepted Answers:
2^6