Unit 4 - Week 2: Probability Review

Assignment 2

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.

1) A coin is tossed until for the first time the same result appears twice in succession. Which of the following statements are true regarding the underlying sample space? *1 point*

- The underlying sample space is finite.
- The underlying sample space consists of sequences formed by tossing a coin infinitely often.
- The underlying sample space is countable.
- The underlying sample space is uncountable.

No, the answer is incorrect.
Score: 0

Accepted Answers:
The underlying sample space is countable.

2) Consider the sample space $\Omega = \{HH, HT, TH, TT\}$ and the event space $\mathcal{F} = 2^{\Omega}$. Which of the following partial functions $\mathbb{P}$ can be extended to a probability function on $\mathcal{F}$? *1 point*

- $\mathbb{P}(\{HH\}) = 0.01, \mathbb{P}(\{HT\}) = 0.09, \mathbb{P}(\{TH\}) = 0.09, \mathbb{P}(\{TT\}) = 0.81,$
- $\mathbb{P}(\{HH\}) = 0.01, \mathbb{P}(\{HT\}) = 0.15, \mathbb{P}(\{TH\}) = 0.03, \mathbb{P}(\{TT\}) = 0.81,$
- $\mathbb{P}(\{HH, TT\}) = 0.5, \mathbb{P}(\{HT, TH\}) = 0.5, \mathbb{P}(\{HH\}) = 0.4$
- $\mathbb{P}(\{HH, TT, TH\}) = 0.5, \mathbb{P}(\{HT, TH\}) = 0.4, \mathbb{P}(\{HH\}) = 0.4$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$\mathbb{P}(\{HH\}) = 0.01, \mathbb{P}(\{HT\}) = 0.09, \mathbb{P}(\{TH\}) = 0.09, \mathbb{P}(\{TT\}) = 0.81,$
$\mathbb{P}(\{HH\}) = 0.01, \mathbb{P}(\{HT\}) = 0.15, \mathbb{P}(\{TH\}) = 0.03, \mathbb{P}(\{TT\}) = 0.81,$
$\mathbb{P}(\{HH, TT\}) = 0.5, \mathbb{P}(\{HT, TH\}) = 0.5, \mathbb{P}(\{HH\}) = 0.4$

3) Consider the events E_1 and E_2. Assume that the events have non zero probability. Which of the following statements are true? *1 point*

- If E_1 and E_2 are independent, then so are E_1^c and E_2^c.
- E_1 and E_1^c are independent
- If E_1 and E_2 are independent, then so are E_1 and E_2^c.
- If E_1 and E_2 have a non trivial intersection, they cannot be independent.

No, the answer is incorrect.
Score: 0

Accepted Answers:
If E_1 and E_2 are independent, then so are E_1^c and E_2^c.
If E_1 and E_2 are independent, then so are E_1 and E_2^c.

4) Let A, B and C be arbitrary events in a probability space. Let E be the event that at least two of the three events among A, B, and C occur. Which of the following expressions correspond to E? *1 point*

- $(A \cup B) \cap (B \cup C) \cap (C \cup A)$
- $(A \cap B) \cap (B \cap C) \cap (C \cap A)$
- $(A \cap B) \cup (B \cap C) \cup (C \cap A)$
- $(A \cup B) \cup (B \cup C) \cup (C \cup A)$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$(A \cup B) \cap (B \cup C) \cap (C \cup A)$
$(A \cap B) \cup (B \cap C) \cup (C \cap A)$

5) Consider throwing an unbiased dice 10 times. If it is known that the throws have produced at least one six, what is the probability of two or more sixes? *1 point*

- $\frac{5^9}{6^{10}-5^{10}}$
- $1 - \frac{5^{10}}{6^{10}-5^{10}}$
- $1 - \frac{10 \cdot 5^9}{6^{10}-5^{10}}$
- $\frac{10 \cdot 5^9}{6^{10}-5^{10}}$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$1 - \frac{10 \cdot 5^9}{6^{10}-5^{10}}$

6) Consider two independent rolls of a standard dice. Let X_1 and X_2 be the numbers that appear of the first and second roll respectively. What is $\mathbb{E}[X_1 + X_2 | X_1 = X_2]$? *1 point*

- 3.5
- 6.5
- 7
- 7.5

No, the answer is incorrect.
Score: 0

Accepted Answers:
7

7) Consider two independent rolls of a standard dice. Let X_1 be the numbers that appear of the first and second roll respectively. Let $Z = max(X_1, X_2)$. What is $\mathbb{E}[Z]$? *1 point*

- 9/2
- 100/36
- 161/36
- 5

No, the answer is incorrect.
Score: 0

Accepted Answers:
161/36

8) Consider rolling an unbiased n-side dice till all the n numbers appear. Let X be the random variable denoting the number of rolls required. What is $\mathbb{E}[X]$? (H_n stands for the nth harmonic number.) *1 point*

- H_n
- $\frac{H_n}{n}$
- nH_n
- $n \log n$

No, the answer is incorrect.
Score: 0

Accepted Answers:
nH_n

9) Assume that the birthday of each person is a random day chosen independently and uniformly from a 365 day year. Which of the following events is most likely? *1 point*

- Finding two people with same birthday in a group of 23 people
- Finding that no two people with the same birthday in a group of 24 people
- Finding two people with same birthday in a group of 24 people
- Finding that no two people with the same birthday in a group of 23 people

No, the answer is incorrect.
Score: 0

Accepted Answers:
Finding two people with same birthday in a group of 24 people

10) Consider a tossing a biased coin twice independently. Let Z be the random variable defined as follows; If the outcome is HT then $Z = 1$. If the outcome is TH then $Z = 0$. If the outcome is either HH or TT, repeat the tossing till an HT or TH is reached. Let X be the number of tosses required. Which of the following statements are true? *1 point*

- X is a geometric random variable.
- Z takes values 0 and 1 with equal probability.
- Z takes values 0 and 1 with a probability that depends on the bias of the coin.
- X is a uniform random variable.

No, the answer is incorrect.
Score: 0

Accepted Answers:
X is a geometric random variable.
Z takes values 0 and 1 with equal probability.