

Unit 5 - Week 2

Course outline

How to access the portal?

Prerequisites Assignment

Matlab and Learning Modules

Week 1

Week 2

 Introduction to Probability Theory Discrete and Continuous Random Variables

 Conditional, Joint, Marginal Probabilities Sum Rule and Product Rule Bayes' Theorem

 Bayes' Theorem - Simple Examples

 Independence Conditional Independence Chain Rule Of Probability

 Expectation

 Variance Covariance

 Some Relations for Expectation and Covariance (Slightly Advanced)

 Quiz : Assignment 2

 Week 2 Feedback : Machine Learning for Engineering and Science Applications

 Assignment 2 solutions

Week 3

Week 4

Week 5

Week 6

Week 7

Week 8

Week 9

Week 10

Week 11

Week 12

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Assignment 2

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

Due on 2019-08-21, 23:59 IST.

 1) The probability that the sum of the values of 2 dice when thrown is equal to 8 is: 1 point

- 1/36
 2/36
 3/36
 5/36

No, the answer is incorrect.

Score: 0

 Accepted Answers:
5/36

 2) Cards are drawn sequentially without replacement from a pack. The probability that an ace is drawn on the third draw from a well shuffled pack of cards given that the first and second ones were also aces is: 1 point

- 2/50
 3/51
 4/52
 12/(51*52)

No, the answer is incorrect.

Score: 0

 Accepted Answers:
2/50

 3) A family has three children. Given that one of the children is a girl, what is the probability that all children are girls? 1 point

- 1/2
 1/4
 1/8
 1/7

No, the answer is incorrect.

Score: 0

 Accepted Answers:
1/7

 4) Which of the following statements is true? 1 point

- The sum of probabilities of a complete set of mutually exclusive events must be 1
 Independent events must be mutually exclusive
 Mutually exclusive events must be independent
 All of the above

No, the answer is incorrect.

Score: 0

 Accepted Answers:
The sum of probabilities of a complete set of mutually exclusive events must be 1

 5) If the random variable X follows the below distribution, what is the value of a? 1 point

$$f(x) = ax^2 \text{ from } x = 0 \text{ to } 1$$

- 4
 3
 2
 1

No, the answer is incorrect.

Score: 0

 Accepted Answers:
3

 6) Which of the following statements is true with regards to the probability distribution function f(x) of a random variable X? 1 point

- f(x) must be less than 1 for all values of x
 f(x) must be non-negative for all values of x
 f(x) cannot exist for negative values of x
 All of the above

No, the answer is incorrect.

Score: 0

 Accepted Answers:
f(x) must be non-negative for all values of x

 7) An image is represented as a vector \mathbf{x} . We wish to classify the image in one of 3 classes -- a cat, a dog or neither. The classification output is represented as a vector \mathbf{y} as follows. If it is a cat, then $\mathbf{y} = [1 \ 0 \ 0]$, if it is a dog then $\mathbf{y} = [0 \ 1 \ 0]$ and if it is neither, then $\mathbf{y} = [0 \ 0 \ 1]$

 Someone creates an algorithm that takes in as input the image and output a probability vector \mathbf{h} -- where each element gives the respective probability.

 For example, if $\mathbf{h} = [0.7 \ 0.2 \ 0.1]$, it means that the given image has a probability of 0.7 that it is a cat, 0.2 that it is a dog and 0.1 that it is neither.

Which of the following statements is true?

- $\sum h_k = 1$
 $h_k = p(y_k = 1)$
 $h_k = p(y_k = 1|x)$
 $h_k = p(y_k = 0|x)$

No, the answer is incorrect.

Score: 0

 Accepted Answers:
 $\sum h_k = 1$
 $h_k = p(y_k = 1|x)$

 8) If a fair coin is tossed 6 times, what is the expected difference between the number of heads and tails? 1 point

- 0
 1
 2
 3

No, the answer is incorrect.

Score: 0

 Accepted Answers:
0

 9) Given two random variables X and Y, which of the following equations always hold true? 1 point

- $E[X+Y] = E[X] + E[Y]$
 $\text{var}(X) + \text{var}(Y) = \text{var}(X+Y)$
 If the covariance of X and Y is zero, then X and Y are independent
 If X and Y are independent, the covariance of X and Y is zero

No, the answer is incorrect.

Score: 0

 Accepted Answers:
 $E[X+Y] = E[X] + E[Y]$
 If X and Y are independent, the covariance of X and Y is zero

 10) What is the expected value of the random variable X with probability distribution function given below? 1 point

$$f(x) = cx^4 \text{ from } x = 0 \text{ to } 1$$

- 3/4
 4/5
 5/6
 Cannot be determined from the given data

No, the answer is incorrect.

Score: 0

 Accepted Answers:
5/6