Unit 2 - Week 0

Assignment 0

The due date for submitting this assignment has passed. **Due on 2020-02-05, 23:59 IST.**
As per our records you have not submitted this assignment.

Please note that this assignment is for practice and it will not be graded.

1) If $P(A) = 0.5$, $P(B) = 0.7$ and $P(C) = 0.9$, find the range of values of $P(A \cup B|C)$? *1 point*

- $[\frac{1}{3}, \frac{2}{3}]$
- $[\frac{2}{3}, 1]$
- $[\frac{1}{2}, 1]$
- $[\frac{1}{2}, \frac{2}{3}]$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$[\frac{2}{3}, 1]$

2) Find the variance of the random variable X where X follows the distribution: *1 point*

$$f_X(x) = 3(2x-1)^2, x \in [0,1]$$

- $\frac{7}{20}$
- $\frac{6}{19}$
- $\frac{3}{20}$
- $\frac{7}{19}$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$\frac{3}{20}$

3) If X and Y are independent random variables, which of the following is false? *1 point*

- $\mathbb{E}[XY] = \mathbb{E}[X]\mathbb{E}[Y]$
- $Cov(X, Y) = 0$
- $Var(X + Y) = Var(X) + Var(Y)$
- $\mathbb{E}[Y|X] = \mathbb{E}[X]$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$\mathbb{E}[Y|X] = \mathbb{E}[X]$

4) Which of the following is not a valid norm function? *1 point*

- $f(x) = \sqrt{\sum_{i=1}^{d} {x_i}^2}$
- $f(x) = \sum_{i=1}^{d} |x_i|$
- $f(x) = \max_i |x_i|$
- $f(x) = \min_i |x_i|$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$f(x) = \min_i |x_i|$

5) Which of the following is false for a matrix, M? *1 point*

- $tr(M)$ is sum of its eigenvalues
- $det(M)$ is product of its eigenvalues
- Real eigenvalues of M are distinct
- Rank of M is number of non-zero eigenvalues

No, the answer is incorrect.
Score: 0
Accepted Answers:
Real eigenvalues of M are distinct

6) Let A be a square non-singular matrix with eigenvalue λ_1 for eigenvector x and B be square matrix with eigenvalue of λ_2 for the same eigenvector x. What is the corresponding eigenvalue for the matrix $A^{-1}B^k A$ for the eigenvector x? *1 point*

- λ_2
- λ_2^k
- $\lambda_1^2 \lambda_2^k$
- $\lambda_1 \lambda_2$

No, the answer is incorrect.
Score: 0
Accepted Answers:
λ_2^k

7) Let X_1 and X_2 be two independent random variables with mean 1 and 4 respectively and variance of 5 and 8. What is the value of $\mathbb{E}[(X_1 - X_2)^2]$? *1 point*

- 38
- 16
- 22
- 3

No, the answer is incorrect.
Score: 0
Accepted Answers:
22

8) You are playing a game in which you have to choose one bag, containing coloured balls, out of two. From the bag you selected you randomly pick a ball. Depending on the colour of the ball you get certain points. Bag 1 contains 5 red, 4 green, 4 yellow balls with 50, 25, -30 as their respective points for the colour. Similarly, Bag 2 contains 4 red, 7 green , 5 yellow with 30, 30, -20 as the respective points. Now, which bag do you choose to maximize the points(you can refrain from playing the game to stay on 0 points). *1 point*

- Bag 1
- Bag 2
- Doesn't matter which bag you choose
- Do not play the game

No, the answer is incorrect.
Score: 0
Accepted Answers:
Bag 1

9) A stick of length, L is broken into two at a point chosen $uniformly randomly$ on the stick. What is the average length of the smaller piece? *1 point*

- $L/2$
- $L/4$
- $L/3$
- $L/8$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$L/4$

10) Let A be a positive definite matrix. If v and w are orthogonal eigenvectors of $A^T A$, which of the following is true? *1 point*

- Av and Aw are orthogonal
- Av and Aw are not orthogonal
- $A^T v$ and $A^T w$ are not orthogonal
- Av and $A^T w$ are not orthogonal

No, the answer is incorrect.
Score: 0
Accepted Answers:
Av and Aw are orthogonal