

# Unit 8 - Week 7

## Course outline

How does an NPTEL online course work?

Week 1

Week 2

Week 3

Week 4

Week 5

Week 6

Week 7

● Advanced Probability Theory (Lec16)

● Advanced Probability Theory (Lec17)

● Advanced Probability Theory (Lec18)

○ Quiz : Assignment 7

○ Week 7 Feedback Form

Week 8

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Assignment Solution

## Assignment 7

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

**Due on 2020-03-18, 23:59 IST.**

1) Which of the following is correct for the PDF of Poisson Distribution ( $\lambda > 1$ )? 1 point

- It is monotonically increasing
- It is monotonically decreasing
- It is hat shaped, achieving a maximum somewhere in the middle
- It is cup shaped, achieving a minimum somewhere in the middle

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
It is hat shaped, achieving a maximum somewhere in the middle

2) Three numbers are chosen one by one between 0 and 1 uniformly and independently, let us denote them as  $X_1, X_2$  and  $X_3$  respectively. What is the probability of  $X_3 < X_2 < X_1$  ? 1 point

- 1/6
- 1/3
- 1/4
- 1/2

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
1/3

3) In a random process, total number of tosses are defined by Poisson(2). Each toss is independent, having probability of success as 2/3. What are the expected number of successes? 1 point

- 2
- 2/3
- 4/3
- 1/3

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
4/3

4) X is a random variable distributed as  $Exp(2)$ . Find  $E(X|X > 2)$  1 point

- 2
- 2.5
- 0.5
- 1

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
2.5

5) Which of the following statements are true? 1 point

- Markov's Inequality only holds for the non-negative random variables
- Chebyshev's Inequality is more general and can be derived from Markov's Inequality
- Chebyshev's Inequality gives us better bounds for variation around any constant
- We can extend Chebyshev's inequality to higher orders as well

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
Markov's Inequality only holds for the non-negative random variables  
Chebyshev's Inequality is more general and can be derived from Markov's Inequality  
Chebyshev's Inequality gives us better bounds for variation around any constant  
We can extend Chebyshev's inequality to higher orders as well

6) Let  $X \sim B(n, 1/2)$ . Find an upper bound on  $P(X \geq \frac{3n}{4})$  using Markov's and Chebyshev's Inequality. 1 point

- Markov's Inequality gives the bound of 2/3
- Markov's Inequality gives the bound of 2/3n
- Chebyshev's Inequality gives the bound of 4/n
- Chebyshev's Inequality gives the bound of 4/n<sup>2</sup>

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
Markov's Inequality gives the bound of 2/3  
Chebyshev's Inequality gives the bound of 4/n

7) Let  $X \sim N(\mu_X, \sigma_X^2)$  and  $Y \sim N(\mu_Y, \sigma_Y^2)$  be two normal distributions having joint distribution as bivariate normal.  $X$  and  $Y$  have correlation as  $\rho$ . Which of the following statements are correct? 1 point

- $aX + bY$  is normally distributed for  $\forall a, b$ .
- If X and Y are independent, then correlation will be 0
- If X and Y have zero correlation, they are independent
- $X - \rho \frac{\sigma_X}{\sigma_Y} Y$  and Y are independent

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
 $aX + bY$  is normally distributed for  $\forall a, b$ .  
If X and Y are independent, then correlation will be 0  
If X and Y have zero correlation, they are independent  
 $X - \rho \frac{\sigma_X}{\sigma_Y} Y$  and Y are independent

Please follow the below paragraph to answer the following set of questions (Question 8, 9 and 10) Accidents in Delhi roads involving Blue line buses obey Poisson process with a rate of 1 accident per 10 days. In a randomly chosen month of 30 days, answer the following questions.

8) What is the probability that there are exactly 4 accidents in the first 15 days? 1 point

- 0.047
- 0.015
- 0.68
- 0.42

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
0.047

9) What is the probability that there are less than 2 accidents in any of the two consecutive days say third and fourth day? 1 point

- 0.81
- 0.98
- 0.99
- 0.89

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
0.98

10) Given that exactly 4 accidents occurred in the first 2 weeks, what is the probability that all the four occurred in the last week? 1 point

- 0.0024
- 0.0049
- 0.49
- 0.0625

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
0.0625