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Courses » Advanced Topics in Probability and Random Processes

Announcements **Course** Ask a Question Progress Mentor FAQ

## Unit 3 - Week 2: Random process basics and infinite sequence of events

### Course outline

How to access the portal

Week 1: Introduction to probability and Random Variable

Week 2: Random process basics and infinite sequence of events

Random Vectors and Random Processes

Infinite Sequence of Events-I

Infinite Sequence of Events-II

Quiz : Assignment 2

Quiz : Assignment 2 revised

Week 3: Convergence of Sequence of

### Assignment 2

The due date for submitting this assignment has passed.

As per our records you have not submitted this assignment. **Due on 2018-09-05, 23:59 IST.**

1) Let  $X$  be a random variable with PDF  $f_X(x) = \begin{cases} 0, & \text{if } x < 0 \\ Ae^{-x}, & \text{otherwise} \end{cases}$  1 point

Find  $A$ ,  $P(X \geq 3)$  and  $E X^2$ .

1,  $e^{-3}$  and 2

1,  $e^{-2}$  and 2

2,  $e^{-3}$  and 3

2,  $e^{-2}$  and 2

**No, the answer is incorrect.**

**Score: 0**

**Accepted Answers:**

1,  $e^{-3}$  and 2

2) Let  $X$  and  $Y$  be a random variable with the PDF  $f_{X,Y}(x,y) = 2e^{-2x-y}u(x)u(y)$  where  $u(x)$  is the unit step function. Find the probabilities  $P(1 < X \leq 2, 2 < Y \leq 4)$  and the marginal PDFs of  $X$  and  $Y$ . 0 points

$e^{-4}(e^{-2} - 1)^2, 2e^{-2x}u(x)$  and  $e^{-y}u(y)$

$e^{-2}(e^{-2} - 1)^2, 2e^{-2x}u(x)$  and  $e^{-y}u(y)$

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Week 5: Markov Chain

Week 6: Discrete Time Markov Chain

Week 7: Continuous Time Markov Chain

Week 8: Martingale Process

New Unit

Assignment Solutions

Score: 0

Accepted Answers:

$e^{-4}(e^{-2} - 1)^2, 2e^{-2x}u(x)$  and  $e^{-y}u(y)$

3) Recall the joint PDF of a two dimensional

1 point

Gaussian  $f_{X,Y}(x,y) = \frac{1}{2\pi\sqrt{1-\rho^2}} e^{-\frac{1}{2(1-\rho^2)} \left[ \frac{(x-\mu_1)^2}{\sigma_1^2} - 2\frac{(x-\mu_1)(y-\mu_2)}{\sigma_1\sigma_2\rho} + \frac{(y-\mu_2)^2}{\sigma_2^2} \right]}$ . Now consider a two

dimensional Gaussian  $f_{X,Y}(x,y) = \frac{5}{8} e^{-\frac{25}{32} \left[ x^2 - \frac{6}{5}xy + y^2 \right]}$ . Find  $E X$ ,  $E Y$ ,  $\frac{\sigma^2}{X}$ ,  $\frac{\sigma^2}{Y}$ , and the conditional expectation  $E [Y | X = 3]$ .

- 1, 1, 2, 2, 2/5, 9/5
- 0, 0, 1, 1, 3/5 and -9/5
- 0, 0, 1, 1, 3/5 and 9/5
- 0, 0, 1, 1, -3/5 and -9/5

No, the answer is incorrect.

Score: 0

Accepted Answers:

0, 0, 1, 1, 3/5 and -9/5

4) Suppose  $X$  and  $Y$  are two random variables with the means  $E X = \frac{7}{4}$ ,  $E Y = \frac{5}{4}$ , mean square values  $E X^2 = 5$ ,  $E Y^2 = 2$  and the correlation  $E X Y = 2$ . Find the values of  $\frac{\sigma^2}{X}$ ,  $\frac{\sigma^2}{Y}$  and  $\text{COV}(X, Y)$ . Are  $X$  and  $Y$  independent? 0 points

- 31/16, 23/16, -3/16 and dependent
- 31/16, 23/16, -3/16 and independent
- 23/16, 23/16, -3/16 and dependent
- 31/16, 23/16, 3/16 and dependent

No, the answer is incorrect.

Score: 0

Accepted Answers:

31/16, 23/16, -3/16 and independent

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