# Quiz 3

⚠ This is a preview of the published version of the quiz

Started: Jun 22 at 9:11pm

# Quiz Instructions

⠿

Question 1 1 pts

Which of the following statement is correct about the expectation for two random variables X and Y?

○

E[XY] = E[X] E[Y] if X and Y are independent.

○

E[XY] = E[X] E[Y] for any X and Y

○

E[X + Y] = E[X] + E[Y] only when X and Y are uncorrelated.

○

E[X + Y] = E[X] + E[Y] only when X and Y are independent.

⠿

Question 2 1 pts

Which of the following statement is correct about the variance and covariance for two random variables X and Y?

○

All of them!

○

Var(X + Y) = Var(X) + Var(Y) if X and Y are independent

○

Var(X + Y) = Var(X) + Var(Y) + 2Cov(X, Y) for any X and Y

○

Var(X + Y + c) = Var(X) + Var(Y) if X and Y are independent and c is a constant.

⋮⋮

## Question 3 1 pts

If I toss a fair die 100 times and count the number of times I get the each faces from 1 to 6 and denote them as X_1 to X_6. What is the distribution of random vector **X** = (X_1, ...X_6)?

○

A multinomial with n=100, and p_1 to p_6 all equal to 1/6.

○

A binomial with n=100, and p=1/6.

○

A Bernoulli with p=1/6.

○

An unknown distribution >_<

⋮⋮

## Question 4 1 pts

If X and Y follow a bivariate Normal (Gaussian) distribution, which of the following statement is correct?

○

All of them!

○

The marginal distribution of X and Y are both normal.

○

The conditional distribution of X | Y and Y | X are both normal.

○

For any constant a and b, define a new random variable Z = aX + bY, and Z is also normal.

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Question 5 1 pts

Let $X_1, X_2, \ldots X_n$ be i.i.d. random variables from Bernoulli(p).

Define

$$Y_1 = X_1 \cdot X_2,$$
$$Y_2 = X_2 \cdot X_3,$$
$$\ldots$$
$$Y_{n-1} = X_{n-1} \cdot X_n,$$
$$Y_n = X_n \cdot X_1.$$
$$Y = Y_1 + Y_2 + \cdots + Y_n$$

Which of the following is correct?

○

E[Y] = np^2

○

E[Y] = n(1-p^2)

○

Var[Y] = np^2

○

Var[Y] = n(1-p^2)

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