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### Homework 5: Maximum Likelihood

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> 1. Covariance

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## 1. Covariance

Calculate the covariance of each of the following pairs of random variables. Please enter answers according to the standard notation.

(a)

1/1 point (graded)

$X \sim \mathcal{N}(\mu, \sigma^2)$  and  $Y = X^2$ . Please enter in terms of  $\mu$  and  $\sigma$ .

$\text{Cov}(X, Y) =$   ✓

$2 \cdot \mu \cdot \sigma^2$

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You have used 1 of 3 attempts

(b)

1/1 point (graded)

 $X, Y$  have the joint probability density function  $f(x, y) = 1, 0 < x < 1, x < y < x + 1$ . Please enter a number. $\text{Cov}(X, Y) =$ 

1/12



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You have used 2 of 3 attempts

(c)

1/1 point (graded)

 $X \sim f(x) = \frac{1}{2b} e^{-|x|/b}, x \in \mathbb{R}, b > 0$  and  $Y = \text{sign}(X)$  $\text{Cov}(X, Y) =$ 

b



Submit

You have used 1 of 3 attempts

(d)

1/1 point (graded)

 $X \sim \text{Unif}(0, 1)$  and given  $X = x, Y \sim \text{Unif}(x, 1)$  $\text{Cov}(X, Y) =$ 

1/24



You have used 2 of 3 attempts

(e)

1/1 point (graded)

 $X$  and  $Y$  have the joint density function

$$f(x, y) = \begin{cases} x + y, & 0 \leq x \leq 1, 0 \leq y \leq 1, \\ 0 & \text{else.} \end{cases}$$

 $\text{Cov}(X, Y) =$ 

You have used 1 of 3 attempts

(f)

1/1 point (graded)

 $X + Y$  and  $X - Y$ , where  $X$  and  $Y$  are independent  $\mathcal{N}(\mu, \sigma^2)$ . $\text{Cov}(X + Y, X - Y) =$ 





You have used 1 of 3 attempts

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