

DATA 1010
IN-CLASS EXERCISES
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Problem 1

Suppose you're 90% sure that your package was delivered today and 75% sure that if it was delivered it would be on your door step rather than tucked away in your mailbox. When you arrive at home and do not see your package right away, what is the conditional probability—given the observed information—that you'll find it in your mailbox?

Problem 2

Does $\text{Cov}(X, Y) = 0$ imply that X and Y are independent?

Consider a random variable X which is uniformly distributed on $\{1, 2, 3\}$ and an independent random variable Z which is uniformly distributed on $\{-1, 1\}$. Set $Y = ZX$. Consider the pair (X, Y) .

Problem 3

Suppose that X_1, \dots, X_n are independent random variables with the same distribution. Find the mean and variance of

$$\frac{X_1 + \dots + X_n}{n}$$

Problem 4

Consider the probability space with $\Omega = [0, 1]$ and probability measure given by the density $f(x) = 2x$ for $x \in [0, 1]$. Find $\mathbb{P}([\frac{1}{2}, 1])$.

Problem 5

Find the expectation of a random variable whose density is the function $f(x) = 2x$ on $[0, 1]$.