3. Exercise: Conditional expectation

Exercise: Conditional expectation

1/1 point (graded)

Let X and Y be zero-mean independent random variables. Which one of the following statements is correct? *Hint:* You can take for granted the intuitive fact that $\mathbf{E}[X \mid X = x] = x$.

- $\mathbf{E}[X+Y \mid X] = 0$.
- $\mathbf{E}[X+Y \mid X] = x$.
- $\mathbf{E}[X+Y \mid X] = X$. ✔
- $\mathbf{E}[X+Y \mid X] = X+Y$.

Solution:

Using linearity of expectations, and then the independence assumption, we have

$$\mathbf{E}[X+Y \mid X = x] = \mathbf{E}[X \mid X = x] + \mathbf{E}[Y \mid X = x] = x + \mathbf{E}[Y] = x.$$

Translating this statement into abstract notation, we obtain $\mathbf{E}[X+Y \mid X] = X$.

提交 You have used 2 of 2 attempts

Answers are displayed within the problem

讨论

显示讨论

Topic: Unit 6 / Lec. 13 / 3. Exercise: Conditional expectation