21. Exercise: Linearity of expectations

Exercises due Feb 28, 2020 05:29 IST *Completed*

Exercise: Linearity of expectations

3.0/3.0 points (graded)

The random variable X is known to satisfy $\mathbf{E}[X] = 2$ and $\mathbf{E}[X^2] = 7$. Find the expected value of $8 - X$ and of $(X-3)(X+3)$.

a) $\mathbf{E}[8 - X] =$ 6 ✔ **Answer:** 6

b) $\mathbf{E}[(X-3)(X+3)] =$ -2 ✔ **Answer:** -2

Solution:

a) The random variable $8 - X$ is of the form $aX + b$, with $a = -1$ and $b = 8$. By linearity, $\mathbf{E}[8 - X] = -\mathbf{E}[X] + 8 = -2 + 8 = 6$.

b) The random variable $(X-3)(X+3)$ is equal to $X^2 - 9$ and therefore its expected value is $\mathbf{E}[X^2] - 9 = 7 - 9 = -2$.

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Answers are displayed within the problem

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About Question b) 6 new 8

? Linearity of function in Part b 6

In part b, g(X)= X^2 - 9 E(g(X)) = g(E(X)) iff g(X) is linear g(X) is not linear, need clarification.