17. Exercise: Random variables with bounded range

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

Exercise: Random variables with bounded range

3/3 points (graded)

Suppose a random variable X can take any value in the interval $[-1, 2]$ and a random variable Y can take any value in the interval $[-2, 3]$.

a) The random variable $X - Y$ can take any value in an interval $[a, b]$. Find the values of a and b:

$a =$ -4 ✔ **Answer:** -4

$b =$ 4 ✔ **Answer:** 4

b) Can the expected value of $X + Y$ be equal to 6?

No ✔ **Answer:** No

Solution:

a) The smallest possible value of $X - Y$ is obtained if X takes its smallest value, -1, and Y takes its largest value, 3, resulting in $X - Y = -1 - 3 = -4$. Similarly, the largest possible value of $X - Y$ is obtained if X takes its largest value, 2, and Y takes its smallest value, -2, resulting in $X - Y = 2 - (-2) = 4$.

b) No matter what the outcome of the experiment is, the value of $X + Y$ will be at most 5, and so the expected value can be at most 5.

Submit You have used 3 of 3 attempts

Answers are displayed within the problem

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