



Bookmarks

- [Module 1: The Basics of R and Introduction to the Course](#)
- [Entrance Survey](#)
- [Module 2: Fundamentals of Probability, Random Variables, Distributions, and Joint Distributions](#)
- [Module 3: Gathering and Collecting Data, Ethics, and Kernel Density Estimates](#)
- [Module 4: Joint, Marginal, and Conditional Distributions & Functions of Random Variable](#)

Module 5: Moments of a Random Variable, Applications to Auctions, & Intro to Regression > Expectation, Variance, and an Introduction to Regression > Markov Inequality and Chebyshev Inequality - Quiz

## Markov Inequality and Chebyshev Inequality - Quiz

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### Question 1

1/1 point (graded)

Suppose you have a probability distribution for a non-negative random variable  $X$ , where the expectation of  $X$  is given by  $E[X] = 5$ . The probability that  $X$  is greater than or equal to 10 is \_\_\_\_\_.

☒ a. no more than 0.5 ✓

☐ b. no more than 0.8

☐ c. no less than 1.25


☐ d. exactly 1.25

### Explanation


The Markov inequality provides an upper bound for the probability that  $X$  is greater than or equal to  $t$ . The inequality states that for any  $t > 0$ ,  $P(X \geq t) \leq E[X]/t$ . In other words, the probability that  $X$  is greater than or equal to **10** is no more than  $5/10 = 0.5$ .

▼ **Module 5: Moments of a Random Variable, Applications to Auctions, & Intro to Regression**


**Moments of a Distribution and Auctions**

Finger Exercises due Oct 31, 2016 at 05:00 IST 

**Expectation, Variance, and an Introduction to Regression**

Finger Exercises due Oct 31, 2016 at 05:00 IST 

**Module 5: Homework**

Homework due Oct 24, 2016 at 05:00 IST 

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✓ Correct (1/1 point)

**Question 2**

1/1 point (graded)

Now suppose that you have a random variable  $X$ , where  $E[X] = 6$  and  $Var[X] = 2$ . The probability that  $X$  is greater than 11 or less than 1 is no more than \_\_\_\_\_.

*Please give your answer to two decimal places.*

0.08

✓ Answer: 0.08

0.08

**Explanation**

We know that  $E[X] = 6$ , and we are interested in the probability that  $X$  is greater than 11 or less than 1. Hence, we are interested in the case where  $t = 5$ . Using the Chebyshev Inequality,

$$P(|X - E[X]| \geq t) \leq \frac{Var(x)}{t^2}$$

$$P(|X - 6| \geq 5) \leq \frac{2}{5^2} = \frac{2}{25} = 0.08$$

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