Problem Set 7

1

0.0/2.0 points (graded)
(Markov variaitions)

In the following problems, modify X and appply Markov's inequality to upper bound $P(X \geq 3)$ when

- $X \geq 2$ and $E[X] = 2.5$

Answer: 1/2

- $X \geq 0$ and $E[X^2] = 5$

Answer: 5/9

Submit You have used 0 of 4 attempts

Answers are displayed within the problem

2

0.0/1.0 point (graded)
Apply Chebyshev's Inequality to lower bound $P(0 \leq X \leq 4)$ when $E[X] = 2$ and $E[X^2] = 6$.

Answer: 0.5

Submit You have used 0 of 4 attempts

Answers are displayed within the problem

3

0.0/1.0 point (graded)

The height of a person is a random variable with variance ≤ 5 inches^2. According to Mr. Chebyshev, how many people do we need to sample to ensure that the sample mean is at most 1 inch away from the distribution mean with probability $\geq 95\%$?

Answer: 100

Submit You have used 0 of 4 attempts

Answers are displayed within the problem

4

0.0/2.0 points (graded)

If X is a non-negative continuous random variable with moment generating function

$$M(t) = \frac{1}{(1-2t)^2}, \quad t < \frac{1}{2}$$

Calculate

- $E[X]$

Answer: 4

- $V(X)$

Answer: 8

Submit You have used 0 of 4 attempts

Answers are displayed within the problem

5

0.0/2.0 points (graded)
Lower bound $P(22 \leq X \leq 38)$ for $X \sim B_{100,0.3}$ with

- Chebyshev's inequality

Answer: 1-21/81

- Chernoff's inequality

Hint, first upper bound $P(X \leq 21)$ and $P(X \geq 39)$.

Answer: 0.431604904365092

Submit You have used 0 of 4 attempts

Answers are displayed within the problem

9

0.0/1.0 point (graded)

Let U, V, and W have pdf's $f_U(x)$, $f_V(x)$, and $0.3f_U(x) + 0.7f_V(x)$. What is the moment generating function of W?

- $M_U(0.3t) + M_V(0.7t)$
- $0.3M_U(t) + 0.7M_V(t)$ ✔
- $M_U(t)^{0.3} + M_V(t)^{0.7}$
- $M_U(t)^{0.3} M_V(t)^{0.7}$

Submit

You have used 0 of 2 attempts

Answers are displayed within the problem