

Standard Deviation

Example

1. Let $f(x) = e \cdot e^x$ for $x \leq -1$ and 0 otherwise. Find the standard deviation of this distribution.
2. Find the standard deviation of the set $\{1, 2, 3\}$.

Problems

3. True False The standard deviation always exists.
4. True False Sometimes, we take the standard deviation to be the negative square root of the variance.
5. True False The variance is always nonnegative.
6. True False If the mean doesn't exist, then the standard deviation doesn't exist.
7. True False If the mean exists, then the standard deviation exists.
8. Let $f(x)$ be $2/3x$ from $1 \leq x \leq 2$ and 0 everywhere else. Find the standard deviation of this distribution.
9. Let $f(x)$ be $-4/x^5$ for $x \leq -1$ and 0 everywhere else. Find the standard deviation of this distribution.
10. Let $f(x)$ be the uniform distribution on $0 \leq x \leq 10$ and 0 everywhere else. Find the standard deviation of this distribution.
11. Let $f(x)$ be $-2x$ from $-1 \leq x \leq 0$ and 0 everywhere else. Find the standard deviation of this distribution.
12. Let $f(x)$ be $24/x^4$ for $x \geq 2$ and 0 everywhere else. Find the standard deviation of this distribution.
13. Let $f(x)$ be the uniform distribution on $-20 \leq x \leq -10$ and 0 everywhere else. Find the standard deviation of this distribution.

Chebyshev's Inequality

Example

14. Let $f(x) = e \cdot e^x$ for $x \leq -1$ and 0 otherwise. Estimate the probability $P(-4 \leq X \leq 0)$. For what a can we say that $P(X \geq a) \geq 0.99$?

Problems

15. True False Chebyshev's inequality can tell us what the probability actually is.
16. True False For Chebyshev's inequality, the k must be an integer.
17. True False Chebyshev's inequality can help us estimate $P(\mu - \sigma \leq X \leq \mu + \sigma)$.
18. Let $f(x)$ be $2/3x$ from $1 \leq x \leq 2$ and 0 everywhere else. Estimate $P(10/9 \leq X \leq 2)$.
19. Let $f(x)$ be $-4/x^5$ for $x \leq -1$ and 0 everywhere else. Estimate $P(X \geq -3)$.
20. Let $f(x)$ be the uniform distribution on $0 \leq x \leq 10$ and 0 everywhere else. Estimate $P(2 \leq X \leq 8)$.
21. Let $f(x)$ be $-2x$ from $-1 \leq x \leq 0$ and 0 everywhere else. Estimate $P(-1 \leq X \leq -1/3)$.
22. Let $f(x)$ be $24/x^4$ for $x \geq 2$ and 0 everywhere else. Estimate $P(X \leq 5)$.
23. Let $f(x)$ be the uniform distribution on $-20 \leq x \leq -10$ and 0 everywhere else. Estimate $P(-18 \leq X \leq -12)$.