

Stat 134: Section 13

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Conceptual Review

Please discuss these short questions with those around you in section. These problems are intended to highlight concepts from lecture that will be relevant for today's problems.

- a. What is the relationship between $f(x)$ and $P(X \in dx)$
- b. Write down the formula for $P(a \leq x \leq b)$, where X is a continuous R.V.
- c. How do we calculate $\mathbb{E}(X)$ and $\text{Var}(X)$ if X is continuous?

Problem 1

Suppose X has density $f(x) = c/x^4$ for $x > 1$, $f(x) = 0$ otherwise, where c is a constant. Find

- a. c ;
- b. $\mathbb{E}(X)$;
- c. $\text{Var}(X)$.

Problem 2

Suppose that X is a random variable whose density is

$$f(x) = \frac{1}{2(1+|x|)^2}, (-\infty < x < \infty)$$

- a. Find $P(-1 < X < 2)$
- b. Find $P(|X| > 1)$
- c. Is $\mathbb{E}(X)$ defined?

Problem 3

Suppose X is a random variable whose density $f(x) = cx(1-x)$ for $0 < x < 1$, and $f(x) = 0$ otherwise. Find:

- a. c ;
- b. $P(X = 1/2)$;
- c. $P(X < 1/2)$;
- d. $\text{Var}(X)$.