

STAT 134: Section 11

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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.

- What's the relationship between $f(x)$ and $P(X \in dx)$?
- Write down the formula for $P(a \leq X \leq b)$, where X is a continuous R.V.
- 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

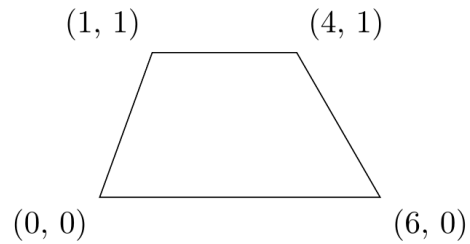
- c
- $E(X)$
- $\text{Var}(X)$

Recall that a probability density function has to be integrated to 1.

Ex 4.1.2 in Pitman's Probability

Problem 2

Suppose a point is picked uniformly at random from the trapezoid shown below, with the indicated vertex coordinates (x, y) . Find the probability density function for the x -coordinate of the randomly selected point.

*Problem 3*

Suppose that X is a random variable whose density is

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

- Find $P(-1 < X < 2)$.
- Find $P(|X| > 1)$.
- Is $E(X)$ defined?

Ex 4.1.5 in Pitman's Probability