Stat 134: Section 9

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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's 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 $Var(X)$ 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. $E(X)$;

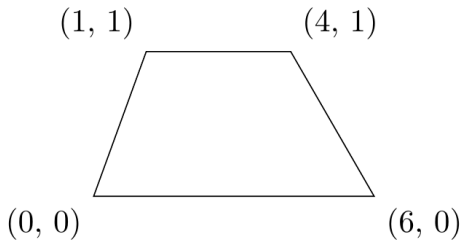
c. $Var(X)$.

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

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

a. Find $P(-1 < X < 2)$.

b. Find $P(|X| > 1)$.

c. Is $E(X)$ defined?

Ex 4.1.5 in Pitman's Probability