Stat 134: Section 13

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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. $E(X)$;

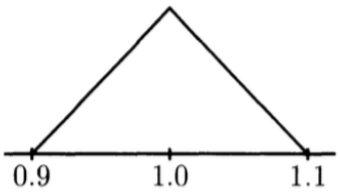
c. $Var(X)$.

Ex 4.1.2 in Pitman's Probability

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

Problem 2

Suppose a manufacturing process designed to produce rods of length 1 inch exactly, in fact produces rods with length distributed according to the density graphed below.



For quality control, the manufacturer scraps all rods except those with length between 0.925 and 1.075 inches before he offers them to buyers.

a. What proportion of output is scrapped?

b. A particular customer wants 100 rods with length between 0.95 and 1.05 inches. Assuming lengths of successive rods produced by the process are independent, how many rods must this customer buy to be 95% sure of getting at least 100 of the prescribed quality?

Ex 4.1.13 in Pitman's Probability

Problem 3

Suppose that X is a random variable whose density is

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

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a. Draw the graph of $f(x)$.

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

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

d. Is $E(X)$ defined?

Ex 4.1.5 in Pitman's Probability