

PAST EXAM QUESTIONS

Question 1 (Spring 2005) The total number of hours, in units of 100 hours, that a family runs a vacuum cleaner over a period of one year is a random variable X having the density function

$$f(x) = \begin{cases} c \frac{x}{2} & , \quad 0 < x < 1 \\ c \frac{2-x}{3} & , \quad 1 \leq x < 2 \\ 0 & , \quad \text{elsewhere} \end{cases}$$

- a) Determine the value c so that $f(x)$ is a probability density function of random variable X .
- b) Find $P(\frac{1}{2} < X < \frac{3}{2})$.
- c) Find the variance and standard deviation of X .

Question 2 (Spring 2007) Let X be a random variable with probability density function $f(x)$, where

$$f(x) = \begin{cases} c_1 x & , \quad 0 < x < 1 \\ c_2 & , \quad 1 < x < 2 \\ 0 & , \quad \text{elsewhere} \end{cases}$$

- a) Find the constants c_1 and c_2 when $E(X) = 13/12$
- b) Calculate $\text{Var}(X)$

Question 3 (Fall 2014) Let $X \sim N(\mu = 50, \sigma^2 = 100)$

a) Calculate the following probabilities

i) $P(X > 45)$

ii) $P(40 < X < 65)$

iii) $P(|X - 50| > 15)$

b) Find the value of x_0 for each case

i) $P(X > x_0) = 0.9332$

ii) $P(35 < X < x_0) = 0.9104$