

Homework 4, ISyE 2027 Spring 2006

Due Monday, February 13

Problem 1 A basketball player shoots three times, independently. The success probability of his first, second, and third shots are 0.8, 0.7, and 0.6 respectively.

(a) What is the sample space Ω of this experiment?

Let X denote the number of successful shots from the three attempts.

(b) $\{X = 0\}$ corresponds to what subset in Ω ? Compute $P(X = 0)$.

(c) $\{X = 2\}$ corresponds to what subset in Ω ? Compute $P(X = 2)$.

(d) Compute the cumulative distribution function F of X .

Problem 2 Hayter, Problem 2.1.8

Problem 3 Let X be a continuous random variable with probability density function (pdf) f , where

$$f(x) = \begin{cases} Ax(1-x), & 0 \leq x \leq 1; \\ 0, & \text{otherwise.} \end{cases}$$

(a) Calculate A .

(b) Calculate the cumulative distribution function F .

Problem 4 Hayter, Problem 2.2.4

Problem 5 The proportion of time, during a 40-hour work week, that an industrial robot was in operation was measured for a large number of weeks. After considering these measurements, we assume that the proportion of time this robot will be in operation during a coming week can be modelled using a continuous random variable X with pdf

$$f(x) = \begin{cases} 2x, & 0 \leq x \leq 1; \\ 0, & \text{otherwise.} \end{cases}$$

(a) Compute $P(X > 1/2)$.

(b) Compute $P(X > 1/2 | X > 1/4)$.

(c) Compute $P(X > 1/4 | X > 1/2)$.

(d) Compute the cdf F .

Problem 6 Hayter, Problem 2.1.10.