Assignment 8

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Papoulis chap 4 Ex 4.8

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Problem

Example 4-8: Suppose the random variable X is such that $X(\xi) = 1$ if $\xi \in A$ and zero otherwise. Find $F(x)$

Solution

Let $\Pr(A) = p$, denote the probability of the event A happening and 'S' denote the universal set.
Given,

$$X(\xi) = \begin{cases} 1 & \text{if } \xi \in A \\ 0 & \text{else} \end{cases}$$

For $x < 0$, $\{X(\xi) \leq x\} = \{\emptyset\}$, so that $F(x) = 0$
For $0 \leq x < 1$, $\{X(\xi) \leq x\} = \{A'\}$, so that $F(x) = \Pr(A') = 1 - p = q$
For $x \geq 1$, $\{X(\xi) \leq x\} = S$, so that $F(x) = 1$ (see figure).

Solution(Contd.)

Hnece, $F(x)$ can be written as :-

$$F(x) = \begin{cases} 0 & ,x \in (-\infty, 0) \\ 1-p & ,x \in [\,0, 1) \\ 1 & ,x \in [\,1, \infty) \end{cases}$$

The corresponding graph of $F(x)$ is plotted next page :-

CDF Graph

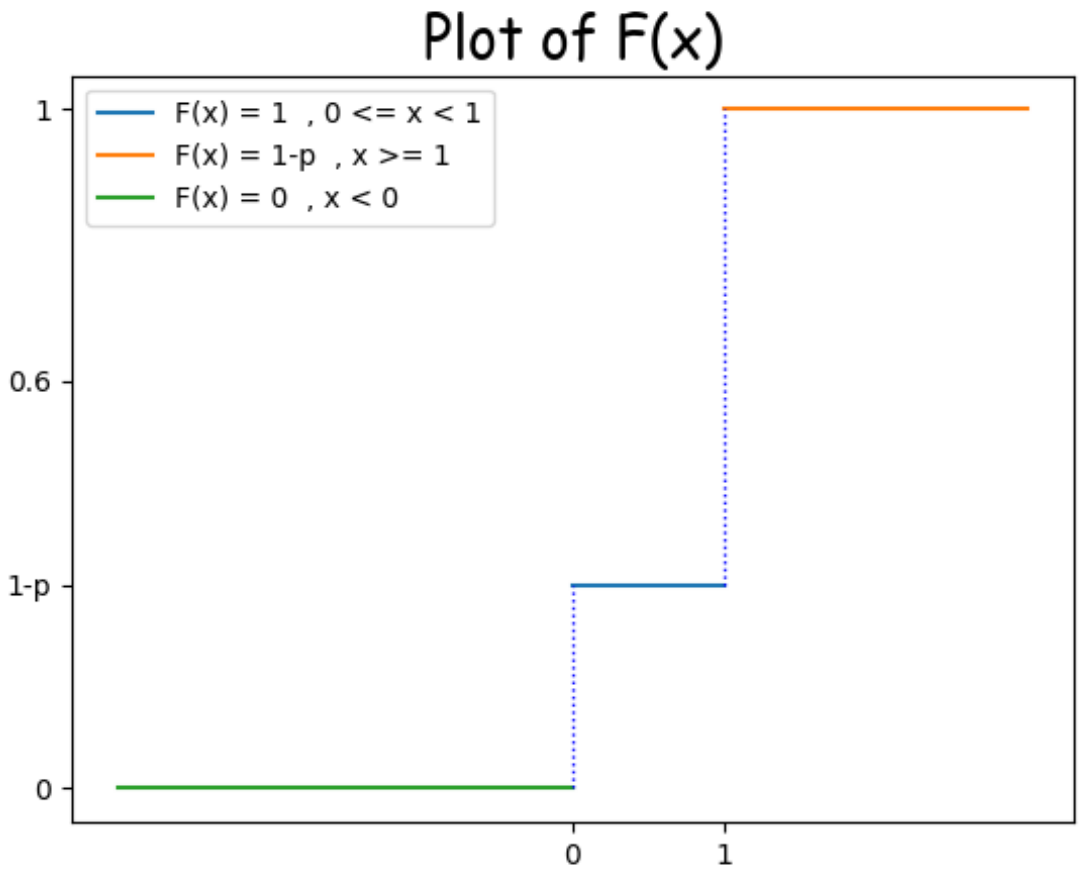

Figure: CDF function

CODES

Python

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