ASSIGNMENT 9 : PAPOULLIS CHAPTER : 4 EXAMPLE - 4.9

AI21BTECH11016

June 5, 2022

Outline

Question

A fair coin is tossed twice, and let the random variable **x** represent the number of heads. Find $F_X(x)$.

Solution

The possible outcomes for the given random variable are :

$$\mathbf{X} = \{HH, HT, TH, TT\}$$

$$\begin{aligned} x(HH) &= 2 \\ x(HT) &= 1 \\ x(TH) &= 1 \\ x(TT) &= 0 \end{aligned}$$

For $x < 0$:

$$\{X\} = \emptyset \tag{1}$$

$$\Rightarrow F_X(x) = 0 \tag{2}$$

For $0 \leq x < 1$:

$$\{X \leq x\} = \{TT\} \tag{3}$$

$$\Rightarrow F_X(x) = \Pr\{TT\} = \Pr\{T\}\Pr\{T\} = \frac{1}{4} \tag{4}$$

For $1 \leq x < 2$:

$$\{X \leq x\} = \{TT, HT, TH\} \tag{5}$$

$$\Rightarrow F_X(x) = \Pr\{TT\} + \Pr\{HT\} + \Pr\{TH\} = \frac{3}{4} \tag{6}$$

For x $\geq$ 2 :

$$\{X \leq x\} = X \tag{7}$$

$$\Rightarrow F_X(x) = 1 \tag{8}$$

Graph of $F_x(x)$