Answer on Question #54496-Math-Statistics and Probability

The probability distribution of X, the number of imperfections per 10 meters of a synthetic fabric in continuous rolls of uniform width, is given by:

x: 0 1 2 3 4

f(x): 0.41 0.37 0.16 0.05 0.01

Construct the cumulative distribution of X.

Solution

The cumulative distribution of X is

$$F(x) = \begin{cases} 0 & x < 0 \\ f(0) = 0.41 & 0 \leq x < 1 \\ f(0) + f(1) = 0.41 + 0.37 & 1 \leq x < 2 \\ f(0) + f(1) + f(2) = 0.41 + 0.37 + 0.16 & 2 \leq x < 3 \\ f(0) + f(1) + f(2) + f(3) = 0.41 + 0.37 + 0.16 + 0.05 & 3 \leq x < 4 \\ f(0) + f(1) + f(2) + f(3) + f(4) = 0.41 + 0.37 + 0.16 + 0.05 + 0.01 & x \geq 4 \end{cases}$$

Therefore, the cumulative distribution of X is

$$F(x) = \begin{cases} 0 & x < 0 \\ 0.41 & 0 \leq x < 1 \\ 0.78 & 1 \leq x < 2 \\ 0.94 & 2 \leq x < 3 \\ 0.99 & 3 \leq x < 4 \\ 1.0 & x \geq 4 \end{cases}$$

Discrete cumulative distribution