EE22BTECH11032 - Meenakshi

Question:Fabry disease in humans is a X-linked disease. The probability (in percentage) for a phenotypically normal father and a carrier mother to have a son with Fabry disease is?

Solution:

n=2 shows the 2 possible X-chromosomes from mother

p=0.5 is probability of disesase carrying X-chromosome from mother

parameter	**value**	**description**
n	2	Number of trials
p	$\frac{1}{2}$	probability of success
$\binom{n}{k}$		Binomial coefficient

TABLE 0: Info Table

$$F(x) = \sum_{k=0}^{1} \binom{n}{k} p^k (1-p)^{n-k} \tag{1}$$

$$F(1) = 0.5 + 0.25 \tag{2}$$

$$= 0.75 \tag{3}$$

$$F(0) = 0.25 \tag{4}$$

Calculating the probability of having a child with the disease:

$$\Pr(X = 1) = F(1) - F(0) \tag{5}$$

$$= 0.75 - 0.25 \tag{6}$$

$$= 0.5 \tag{7}$$

Since the probability of having a son = 0.5,
Total Probability

$$= \Pr(X = 1) * 0.5 \tag{8}$$

$$= 0.25 \tag{9}$$