

# NCERT Assignment

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In a family having three children, there may be no girl, one girl, two girls, or three girls. So the probability of each is  $1/4$ . Is this correct? Justify your answer.

**Solution:**

NO, it is not correct.

| Parameter | Values                | Description               |
|-----------|-----------------------|---------------------------|
| $n$       | 3                     | Number of children        |
| $k$       | 0,1,2,3               | Number of girls           |
| $p$       | 0.5                   | Probability of girl       |
| $X$       | 1 if girl<br>0 if boy | Bernoulli Random Variable |
| $Y$       | $\sum_{i=1}^n X_i$    | Binomial Random Variable  |

TABLE 1: Definition of  $X$  and parameters.

The cdf of  $Y$  is given by

$$F_Y(n) = \Pr(Y \leq n) \quad (1)$$

$$= \sum_{k=0}^n {}^3C_k p^k (1-p)^{3-k} \quad (2)$$

$$F_Y(0) = \Pr(Y \leq 0) \quad (3)$$

$$= \sum_{k=0}^0 {}^3C_k (0.5)^k (0.5)^{3-k} \quad (4)$$

$$= 0.125 \quad (5)$$

$$F_Y(1) = \Pr(Y \leq 1) \quad (6)$$

$$= \sum_{k=0}^1 {}^3C_k (0.5)^k (0.5)^{3-k} \quad (7)$$

$$= 0.375 \quad (8)$$

$$F_Y(2) = \Pr(Y \leq 2) \quad (9)$$

$$= \sum_{k=0}^2 {}^3C_k (0.5)^k (0.5)^{3-k} \quad (10)$$

$$= 0.375 \quad (11)$$

$$F_Y(3) = \Pr(Y \leq 3) \quad (12)$$

$$= \sum_{k=0}^3 {}^3C_k (0.5)^k (0.5)^{3-k} \quad (13)$$

$$= 0.125 \quad (14)$$

$\therefore$  Hence Proved