

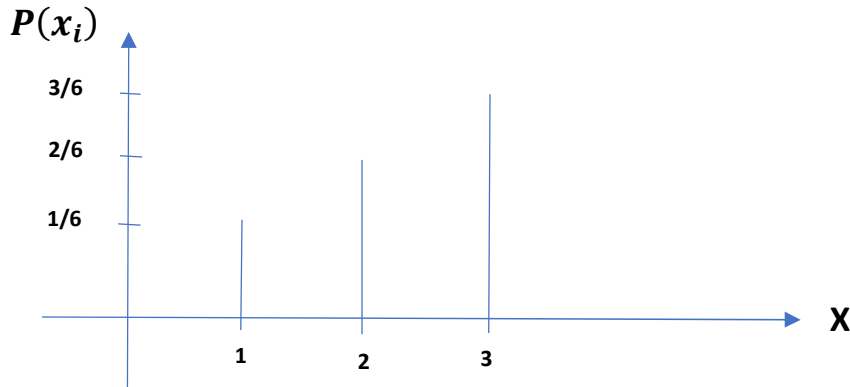
Sol) 1-

| $x$        | 1   | 2   | 3   |
|------------|-----|-----|-----|
| $P(X = x)$ | 1/6 | 2/6 | 3/6 |

$$\sum P(X = x_i) = 1$$

$$\sum P(X = x_i) = P(X = 1) + P(X = 2) + P(X = 3) = \frac{1}{6} + \frac{2}{6} + \frac{3}{6} = \frac{6}{6} = 1$$

تحقق الشرط



رسم الدالة

$$2\_ \quad F(X) = P(X \leq x)$$

$$F(0) = P(X \leq 0) = P(X = 0) = 0$$

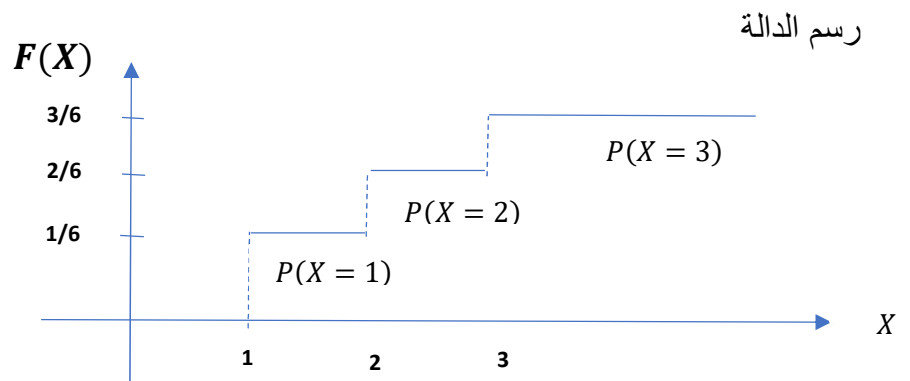
$$F(1) = P(X \leq 1) = P(X = 0) + P(X = 1) = \frac{1}{6}$$

$$F(2) = P(X \leq 2) = P(X = 0) + P(X = 1) + P(X = 2) = \frac{1}{6} + \frac{2}{6} = \frac{3}{6}$$

$$F(3) = P(X \leq 3) = P(X = 0) + P(X = 1) + P(X = 2) + P(X = 3)$$

$$= \frac{1}{6} + \frac{2}{6} + \frac{3}{6} = \frac{6}{6} = 1$$

$$\therefore F(X) = \begin{cases} 0 & x < 1 \\ \frac{1}{6} & 1 \leq x < 2 \\ \frac{3}{6} & 2 \leq x < 3 \\ 1 & x \geq 3 \end{cases}$$



رسم الدالة

وفي حالة توفر الدالة التراكمية فقط والمطلوب إيجاد دالة الكتلة الاحتمالية  $P(X)$  يتم اجراء عملة  
الطرح من الأعلى الى الأسفل وفق الأسلوب الاتي :-

$$_ P(0 < x \leq 1)$$

$$P(X = 1) = F(b) - F(a) = \frac{1}{6} - 0 = \frac{1}{6} \quad P(a < x \leq b)$$

$$_ P(1 < x \leq 2)$$

$$P(X = 2) = F(2) - F(1) = \frac{3}{6} - \frac{1}{6} = \frac{2}{6}$$

$$_ P(2 < x \leq 3)$$

$$P(X = 3) = F(3) - F(2) = 1 - \frac{3}{6} = \frac{3}{6}$$

**Ex)** Two fair dice are thrown once , let  $X$  denoted the maximum of the two  
number shown by two dice , then the *P.m.f* of  $X$  is given by :-

| $x$        | 1    | 2    | 3    | 4    | 5    | 6     |
|------------|------|------|------|------|------|-------|
| $P(X = x)$ | 1/36 | 3/36 | 5/36 | 7/36 | 9/36 | 11/36 |

**SoL)**

$$F(x) = P(X \leq x) = P(X = ?)$$

$$F(0) = P(X \leq 0) = P(X = 0) = 0$$

$$F(1) = P(X \leq 1) = P(X = 1) = \frac{1}{36}$$

$$F(2) = P(X \leq 2) = P(X = 1) + P(X = 2) = \frac{1}{36} + \frac{3}{36} = \frac{4}{36}$$

$$F(3) = P(X \leq 3) = P(X = 1) + P(X = 2) + P(X = 3) = \frac{1}{36} + \frac{3}{36} + \frac{5}{36} = \frac{9}{36}$$

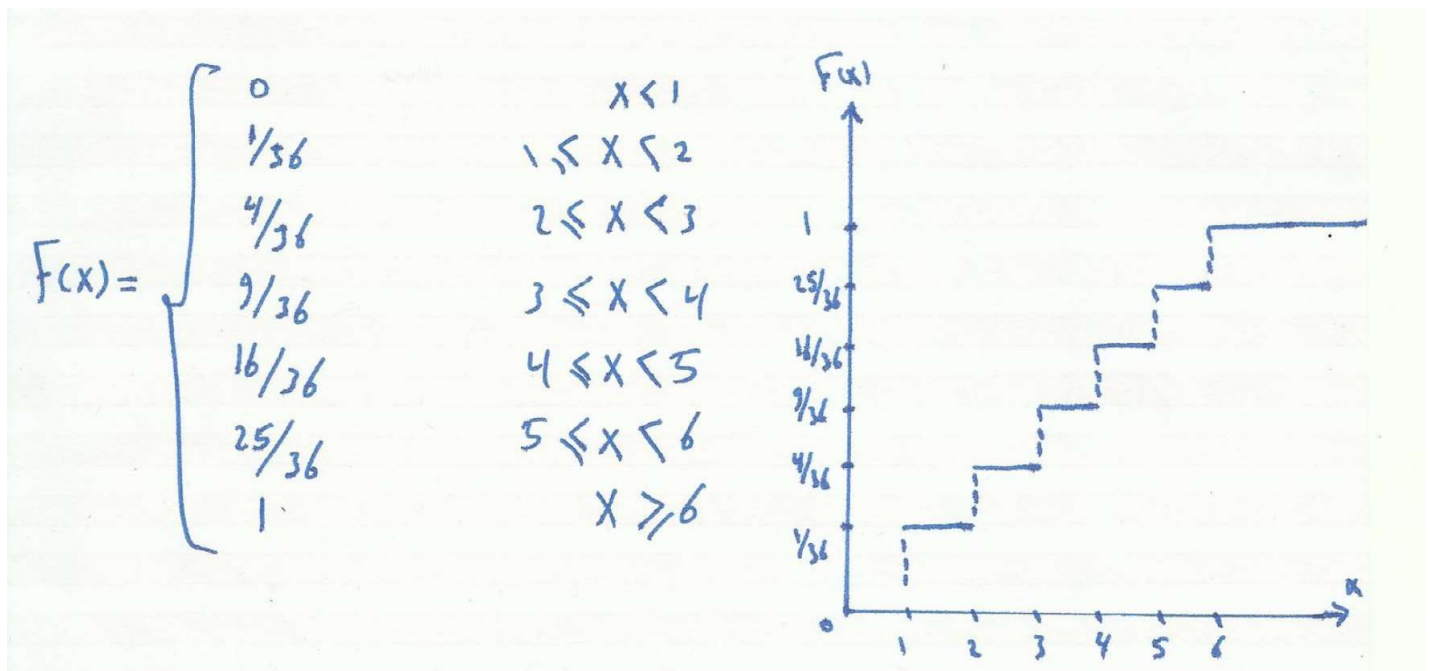
$$F(4) = P(X \leq 4) = P(X = 1) + P(X = 2) + P(X = 3) + P(X = 4) = \frac{16}{36}$$

$$F(5) = P(X \leq 5) = P(X = 1) + P(X = 2) + P(X = 3) + P(X = 4) + P(X = 5) = \frac{25}{36}$$

$$F(6) = P(X \leq 6) = P(X = 1) + P(X = 2) + P(X = 3) + P(X = 4) + P(X = 5) + P(X = 6) = \frac{36}{36} = 1$$

$$F(7) = 1, F(8) = 1$$

|      |      |      |      |      |      |
|------|------|------|------|------|------|
| 1    | 2    | 3    | 4    | 5    | 6    |
| (11) | (22) | (33) | (44) | (55) | (66) |
|      | (12) | (23) | (34) | (45) | (56) |
|      | (21) | (32) | (43) | (54) | (65) |
|      |      | (13) | (24) |      |      |
|      |      | (31) | (42) |      |      |
|      |      |      | (14) |      |      |
|      |      |      | (41) |      |      |



**Ex)** A box contains 6 red and 4 white balls. Two balls are drawn at random, Let Y denote the number of red balls that can be drawn. Then Y must assume one of the values 0, 1 and 2 with respective probabilities  $2/15$ ,  $8/15$  and  $5/15$ , Therefore, the (P. m. f.) of Y is given by :-

| y          | 0      | 1      | 2      |
|------------|--------|--------|--------|
| $P(Y = y)$ | $2/15$ | $8/15$ | $5/15$ |

$$\sum P(Y = y_i) = P(Y = 0) + P(Y = 1) + P(Y = 2) = \frac{2}{15} + \frac{8}{15} + \frac{5}{15} = \frac{15}{15} = 1$$

The distribution function (c.p.f.) or (D.F.)

$$F(y) = P(Y \leq y)$$

$$F(0) = P(Y < 0)$$

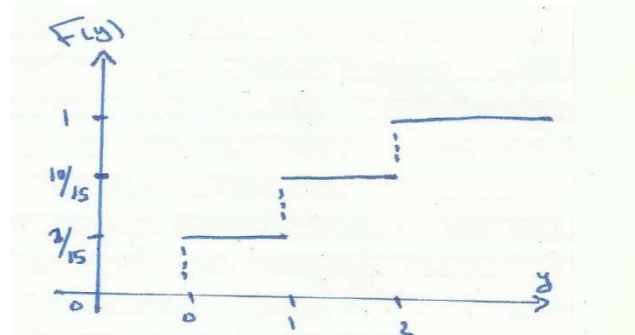
$$F(0) = P(Y \leq 0) = P(Y = 0) = \frac{2}{15}$$

$$F(1) = P(Y \leq 1) = P(Y = 0) + P(Y = 1) = \frac{2}{15} + \frac{8}{15} = \frac{10}{15}$$

$$F(2) = P(Y \leq 2) = P(Y = 0) + P(Y = 1) + P(Y = 2) = \frac{10}{15} + \frac{5}{15} = \frac{15}{15} = 1$$

$$F(3) = P(Y \leq 3) = 1$$

$$F(y) = \begin{cases} 0 & x < 0 \\ 2/15 & 0 \leq x < 1 \\ 10/15 & 1 \leq x < 2 \\ 1 & x \geq 2 \end{cases}$$



إذا طلب دالة  $P(y)$  عند توفر دالة  $F(y)$  فإن

$$P(a < y \leq b) = F(b) - F(a)$$

$$P(y = b)$$

$$P(0 < y \leq 1) = F(1) - F(0) = \frac{10}{15} - \frac{2}{15} = \frac{8}{15}$$

$$P(y = 1)$$