

Q.1) Find the cdf of geometric distribution.

1) Sketch the graph of $F(x, p)$ for $x=1, 2, 3, 4, 5$ and $p=0.75$.

Soln pmf of geometric dist.

$$p_x(x) = pq^{x-1} \text{ for } x=1, 2, \dots$$

$$\therefore F_x(x) = P(X \leq x)$$

$$= \sum_{t=1}^x pq^{t-1}$$

$$= p \sum_{t=1}^x q^{t-1}$$

$$= p [q^0 + q^1 + q^2 + \dots + q^{x-1}]$$

$$= p [1 + q + q^2 + \dots + q^{x-1}]$$

$$= p \left(\frac{1-q^x}{1-q} \right)$$

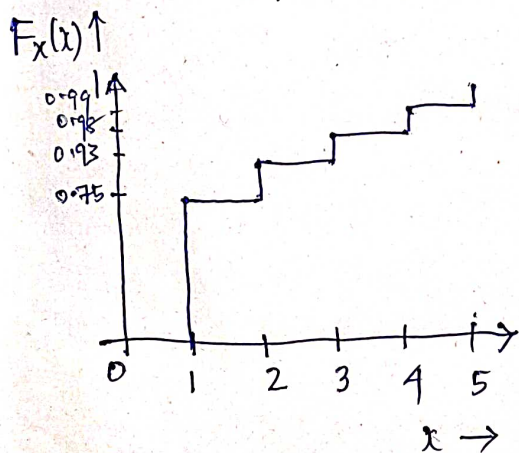
$$\left(1 + x + x^2 + \dots + x^n = \frac{1-x^{n+1}}{1-x} \right)$$

$$= 1 - q^x = 1 - (1-p)^x \text{ for } x=1, 2, 3, \dots$$

1) $F(x, p)$ for $x=1, 2, 3, 4, 5$ and $p=0.75$

$$F_x(x) = 1 - (1-0.75)^x \text{ for } x=1, 2, 3, 4, 5$$

$$= 1 - 0.25^x$$



$$F_x(x) = \begin{cases} 0 & \text{for } x < 1 \\ 0.75 & \text{for } 1 \leq x < 2 \\ 0.93 & \text{for } 2 \leq x < 3 \\ 0.98 & \text{for } 3 \leq x < 4 \\ 0.99 & \text{for } 4 \leq x < 5 \\ 1 & \text{for } x \geq 5. \end{cases}$$

Exercise

Find the cdf of binomial distribution.