① Probability of x success in n trials

$$P(X=x) = {}^{n}C_{x}\, p^{x}\, q^{n-x}$$

Expected No of successes in n trials $E(X) = np$

Binomial Distribution

② Probability of x failures before first success

$$P(X=x) = q^{x} p$$

Expected number of failures before first success $E(x) = \frac{1}{p}$

GEOMETRIC

③ Probability of event occuring x times when expected number of events is λ

$$P(X=x) = \frac{e^{-\lambda} \lambda^{x}}{x!}$$

POISSION

Probability of an event range when all events are equally probable $P(a \leq x \leq b) = \frac{1}{b-a}$

Expected $\frac{a+b}{2}$

Uniform

Probability that a failure will occur before time t when mean time is $1/\lambda$

(memoryless)

Exponential

$P(X \leq t) = 1 - e^{-\lambda t}$ (time to next event)

Probability that k^{th} event occurs before x^{th} time

(time until k^{th} event is x)

$1/k\theta \rightarrow$ Mean

$$F(x) = 1 - \sum_{i=1}^{k-1} \frac{e^{-k\theta x} (k\theta x)^i}{i!}$$

Erlang

$R(x) = 1 - F(x)$

reliability function

it will last at least x time or after

(time to k^{th} event)

MG1 $\rightarrow$

$$L = \lambda W$$

$$\rho = \frac{\lambda}{\mu}$$

arrival rate/hr

service time/hr

$$L_S = \rho + \frac{\rho^2\left(1 + \sigma^2 \mu^2\right)}{2(1-\rho)}$$

MM1 $\rightarrow$ $\sigma = 1/\mu$

$$P_n = (1-\rho)\,\rho^n$$

Number of parallel servers

system capacity (max queue size)

$$M \mid M \mid 1 \mid \infty \mid \infty$$

Interarrival distribution

service time distribution

Calling population (max no of people)