Discrete (Mass function)

geometric

(lack of memory)

$p(x) = (1-p)^x p$

$\mu = \frac{1}{p}$

$\sigma^2 = \frac{1-p}{p^2}$

-ve binomial

till/untill

$p(x) = \binom{x-1}{r-1} p^r * (1-p)^{x-r}$

$\mu = \frac{r}{p}$

$\sigma^2 = \frac{r(1-p)}{p^2}$

(Called pascal)

Hypergeometric

(Lots) N

$$p(x) = \frac{\binom{D}{x}\binom{N-D}{n-x}}{\binom{N}{n}}$$

$\mu = \frac{nD}{N}$ number of non Conforming

$\sigma^2 = \frac{nD}{N}\left(1-\frac{D}{N}\right)\left(\frac{N-n}{N-1}\right)$

$$\boxed{\binom{a}{b} = \frac{a!}{b!(a-b)!}}$$

$\Gamma(r) = (r-1)!$

لو هليت Hypergeometric
كال binomial
بطلع رقم قريب
بس مش نفسه.

Binomial

واخذت 10 عينات وشفت
(كم non-conforming طلع)
ان عدد $X =$ رقم

$p(x) = \binom{n}{x} p^x (1-p)^{n-x}$

عدد كل

احتمالية ان
عدد ال non-conform
$X =$ رقم

$\mu = np$

$\sigma^2 = np(1-p)$

percent of non Conforming output.

Sample fraction defective

$\hat{p} = \frac{X}{n}$

$p(\hat{p} \le a) = \sum_{x=0}^{[na]} \binom{n}{x} p^x (1-p)^{n-x}$

$\sigma_{\hat{p}}^2 = \frac{p(1-p)}{n}$

poisson

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

$\mu = \lambda$

$\sigma^2 = \lambda$

1 unit of product has number of defects

λ: number of defects/unit.

μ & σ^2 Same.

Continous distrebution

Normal

$f(x) = \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2}$

$p(x \le a) = F(a) = \int_{-\infty}^{a} \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2} dx$

standarization:

$Z = \frac{X-\mu}{\sigma}$

$p(x \le a) = p\left(z \le \frac{a-\mu}{\sigma}\right) = \Phi\left(\frac{a-\mu}{\sigma}\right)$

Cumalitue distrebution function

wiebull

$f(x) = \frac{\beta}{\varphi}\left(\frac{x}{\varphi}\right)^{\beta-1} \exp\left(-\left(\frac{x}{\varphi}\right)^{\beta}\right)$

$\mu = \varphi\Gamma\left(1+\frac{1}{\beta}\right)$

$\sigma^2 = \varphi^2\left[\Gamma\left(1+\frac{2}{\beta}\right) - \left(\Gamma\left(1+\frac{1}{\beta}\right)\right)^2\right]$

$F(a) = 1 - \exp\left(-\left(\frac{a}{\varphi}\right)^{\beta}\right)$

Exponential

$f(x) = \lambda e^{-\lambda x}$

$\mu = \frac{1}{\lambda}$

$\sigma^2 = \frac{1}{\lambda^2}$

(Lack of Memory)

- Stand by only.

if Said expo but no stand by then binomial

Gamma

$f(x) = \frac{\lambda}{\Gamma(r)}(\lambda x)^{r-1} e^{-\lambda x}$

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

$\sigma^2 = \frac{r}{\lambda^2}$

$F(a) = 1 - \sum_{k=0}^{r-1} \frac{e^{-\lambda a}(\lambda a)^k}{k!}$

Survive

Fail

Central Limit Theorem

$$\frac{Y - \sum_{i=1}^{n}\mu_i}{\sqrt{\sum_{i=1}^{n}\sigma_i^2}}$$