

DISTRIBUZIONI DI POISSON $X \sim \text{Pois}(\mu)$

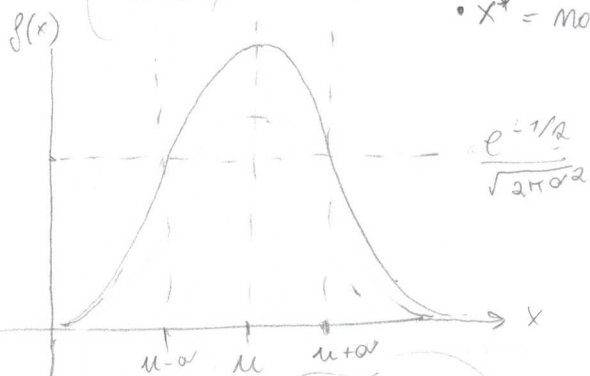
- $f_{\infty}(k) = \frac{\mu^k}{k!} e^{-\mu}$
- $S \sim \text{Binom}(n, \frac{\mu}{n}) \rightarrow \text{Pois}(\mu)$
- $F_{\infty}(t) = P\{X \leq t\} = \sum_{k \leq t} f_{\infty}(k) = \sum_{k \leq t} \frac{\mu^k}{k!} e^{-\mu}$
- $\text{Var}(X) = E(X)$
- $E(X) = \mu$

DISTRIBUZIONI UNIFORMI $X \sim \text{Unif}(a, b)$

- $F(t) = \frac{t-a}{b-a}$
- $X = a + (b-a)U \rightarrow \text{Unif}(0,1)$
- $E(X) = \frac{a+b}{2}$
- $\text{Var}(X) = \left(\frac{b-a}{\sqrt{3}}\right)^2$
- TEMPO di ATTESA UNIFORME ha una FORTE MEMORIA

DISTRIBUZIONE NORMALE / DI GAUSS $X \sim \text{Norm}(\mu, \sigma^2)$

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



$$X = \mu + \sigma Z \text{ con } Z \sim \text{Norm}(0,1)$$

$$E(Z) = 0$$

$$\text{Var}(Z) = E(Z^2) = 1$$

$$E(X) = \mu + \sigma E(Z) = \mu$$

$$\text{Var}(X) = \sigma^2 \text{Var}(Z) = \sigma^2$$

$$F_X(t) = P\{X \leq t\} = P\{X^* \leq z\} = \Phi(z)$$

$$P\{X^* \leq z\} = \int_{-\infty}^z p(x) dx = \Phi(z)$$

$$P\{X^* > z\} = 1 - \Phi(z)$$

$$P\{|X^*| \leq k\} = 2\Phi(k) - 1$$

PROCESSI DI POISSON $X \sim \text{Pois}(\lambda) \rightarrow \text{INTENSITA'}$

- $N/6 = \text{diarree in 6 mesi}$
- mi permette di lavorare su scale temporali

DISTRIBUZIONI ESPONENZIALI: $T \sim \text{EXP}(\lambda)$

- $f_T(t) = 1 - e^{-\lambda t}$
- $F_T(t) = \lambda e^{-\lambda t}$
- MEDIANA = $\frac{\ln(2)}{\lambda}$
- $R_T(t) = e^{-\lambda t}$
- VARIANZA = $E(T^2) - E^2(T) = \frac{1}{\lambda^2}$
- MEDIA = DEV. ST. = $\frac{1}{\lambda}$

DISTRIBUZIONI GAMMA $T_K \sim \text{Gamma}(K, \lambda)$

- $f_{T_K}(t) = \frac{\lambda^K}{(K-1)!} t^{K-1} e^{-\lambda t}$
- $F_{T_K}(t) = 1 - \sum_{j=0}^{K-1} \frac{(\lambda t)^j}{j!} e^{-\lambda t}$
- $E(T_K) = \frac{K}{\lambda}$
- $\text{SD}(T_K) = \frac{\sqrt{K}}{\lambda}$

se uso $P(T_3 \leq 2)$
arrivo a $j=2$

QUANTILI NORMALI $X \sim \text{Norm}(\mu, \sigma^2)$

$$F(t) = \Phi\left(\frac{t-\mu}{\sigma}\right)$$

$$F^{-1}(w) = t = X_w = \mu + \sigma \Phi^{-1}(w)$$



APPROSSIMAZIONE DI LAPLACE

Se $S \sim \text{Binom}(n, p)$ con n, p grandi, allora

$$S \sim \text{Norm}(np, npq) \leftarrow \text{ricorda che } q = 1-p$$

$$P\{S=K\} = \Phi\left(\frac{K+1/2-\mu}{\sigma}\right) - \Phi\left(\frac{K-1/2-\mu}{\sigma}\right)$$

• RICORDA: in ogni caso aggiungo e tolgo $1/2$