$$P_n(k) = \binom{n}{k} p^k q^{n-k} \qquad k = 0, 1, \dots, n$$

X_i r.a. i-esima

0 insuccesso

1 successo

$$X_i : S \longrightarrow \mathbb{R}$$

$$E\{X_i\} = 1 \cdot p + 0 \cdot q = p = \eta_{x_i}$$

$$\sigma^2_{x_i} = E\left\{\left(X_i - E\{X_i\}\right)^2\right\} = (1-p)^2 p + (0-p)^2(1-p)$$

$$= (1 + p^2 - 2p)p + p^2 - p^3 =$$

$$= p + \cancel{p^3} - 2p^2 + p^2 - \cancel{p^3} =$$

$$= p(1-p) = pq$$

$$X = \sum_{i=1}^{n} x_i$$

$$\eta_x = E\{X\} = E\left\{\sum_{i=1}^{n} x_i\right\} = \sum_{i=1}^{n} E\{X_i\} = \sum_{i=1}^{n} p = np$$

$$\sigma^2_x = E\left\{(X - \eta_x)^2\right\} = E\left\{\left(\sum_{i=1}^{n} X_i - \eta_x\right)^2\right\} =$$

$$= E\left\{\left(\sum_{i=1}^{n} x_i - E\left\{\sum_{i=1}^{n} x_i\right\}\right)^2\right\} =$$

$$\left(\underline{\text{N.B.}} \quad X_i \text{ indip } X_j\right) = \sum_{i=1}^{n} E\left\{\left(X_i - E\{X_i\}\right)^2\right\} =$$

$$= \sum_{i=1}^{n} pq = npq$$

$npq >> 1$

$$P_n(K) \cong \frac{1}{\sqrt{2\pi npq}} e^{-\frac{(K-np)^2}{2npq}}$$

$\boxed{es}$ $n=10$ $p=0,2$ num.esp=1000

dati = binornd(n, p, 1000, 1)

→ Fare istogramma

edge = [0:1:10]

num_K = histc(dati, edge);

→ normalizz. per avere ddp (pdf)

$$p\_K = \frac{num\_K}{1000}$$

→ stem(K, p_K)

→ hold on

→ binopdf(...)

→ V.P. $n >>$ $(npq >> 1)$

Sovrapporre con gaussiana

normpdf( )

$n = 100$

→ a partire di n trovare p

che massimizza similitudine

con gaussiana

$\boxed{es}$

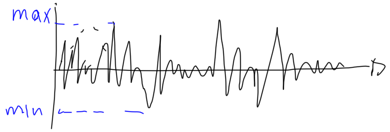
→ generare num. distr. gaussiana

$\eta = 10 \quad \sigma = 3$

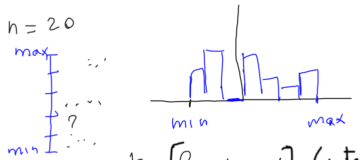
num. 20

1000

→ stimare la ddp con istogramma

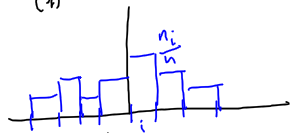


n = 20



$\text{num\_int} = \lceil \log_2(n) + 1 \rceil$ (intero superiore)

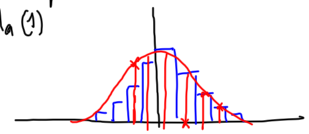
(1)



n = 20

n = 1000

ripetere con num_int doppio di regola (1)



edge = linspace(min, max, num_int)

punti_gauss = punti intermedi di edge