# Link 12/05/2020

- Link alle due lezioni registrate:
  - https://drive.google.com/open?id=1P3udSG0TFx-QCZYUFxY6qecmpL1DVVR-

# Fit ai minimi quadrati

$$A = \frac{\Sigma x^2 \Sigma y - \Sigma x \Sigma xy}{\Delta}$$

$$B = \frac{N\Sigma xy - \Sigma x \Sigma y}{\Delta},$$

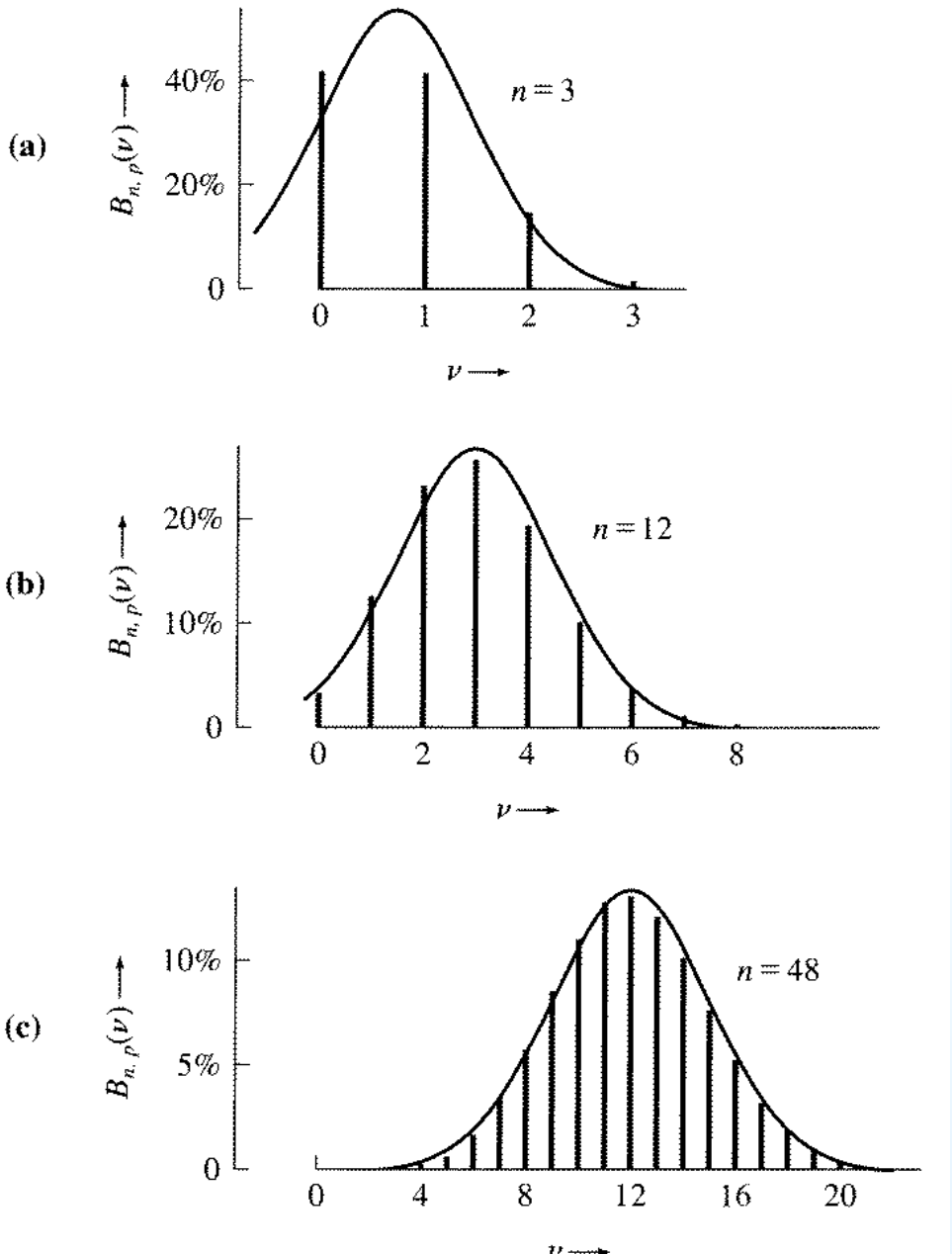
$$\Delta = N\Sigma x^2 - (\Sigma x)^2.$$

$$\sigma_y = \sqrt{\frac{1}{N-2}\sum_{i=1}^{N}(y_i - A - Bx_i)^2},$$

$$\sigma_A = \sigma_y \sqrt{\frac{\Sigma x^2}{\Delta}}$$

$$\sigma_B = \sigma_y \sqrt{\frac{N}{\Delta}}$$

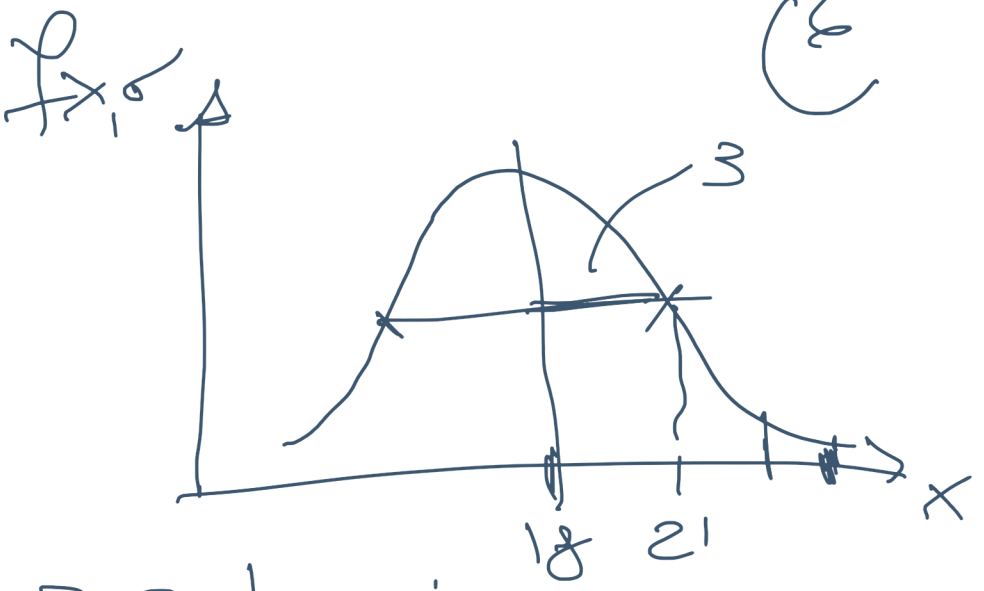
# Binomiale


(a)
$B_{n,p}(\nu)$
40%
20%
0
$n = 3$
0
1
2
3
$\nu$
(b)
$B_{n,p}(\nu)$
20%
10%
0
$n = 12$
0
2
4
6
8
$\nu$
(c)
$B_{n,p}(\nu)$
10%
5%
0
$n = 48$
0
4
8
12
16
20
$\nu$

$f_{X;\sigma}$ $X = 18$ $\sigma = 3$

$f_{18,3}(23) = 3.32\%$

$3.36\%$




(c)

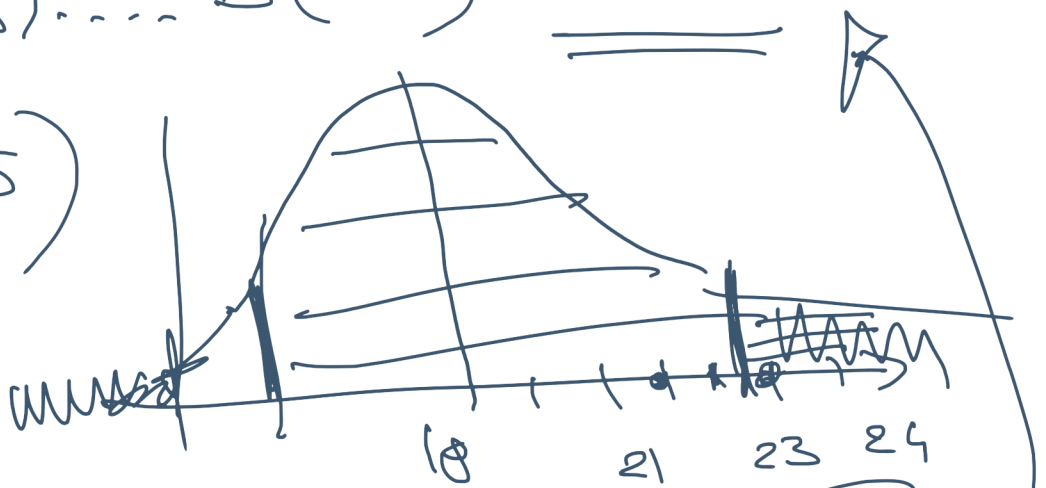
Almeno 23 Testa su 36 lanci

$b(23) + b(24) + b(25) \ldots b(36) = 6.6\%$

$P_{18,3}(x > 22.5) = P(t > 1.5)$

$22.5 - 18 = 4.5$

$\frac{4.5}{3} = 1.5\,\sigma$




$P(x < 1.5\sigma) = 86.4\%$

$= 13.6\%$

$6.8\%$

$/2$

$$\bar{\nu} = \sum_{\nu} \nu \, b_{n\phi}(\nu) = n\phi$$

$$\sigma_\nu = \sqrt{n\phi(1-\phi)}$$

$b_{n\phi}(\nu) \sim f_{\bar{X},\sigma}(\nu)$ n suff. grande

$\bar{X} = \bar{\nu}$

$\sigma = \sigma_\nu$

$\phi = 1/2$ $n = 36$ lanci $\nu = 23$ successi

$$b_{36\,1/2}(\nu = 23) = \frac{36!}{23!\,13!}\left(\frac{1}{2}\right)^{36} = 3.36\%$$

$$\bar{\nu} = 36 \cdot \frac{1}{2} = 18 \qquad \sigma_\nu = \sqrt{36 \cdot \frac{1}{2} \cdot \frac{1}{2}} = \sqrt{9} = 3$$

(4)

MONETINA "TESTA" $p=\frac{1}{2}$ $q=\frac{1}{2}$

$n=4$

$x=0$

$$b_{4,1/2}(0)=\frac{4!}{0!\,4!}\cdot\left(\frac{1}{2}\right)^0\left(\frac{1}{2}\right)^4=\frac{1}{16}$$

$2^4=2\cdot2\cdot2\cdot2$

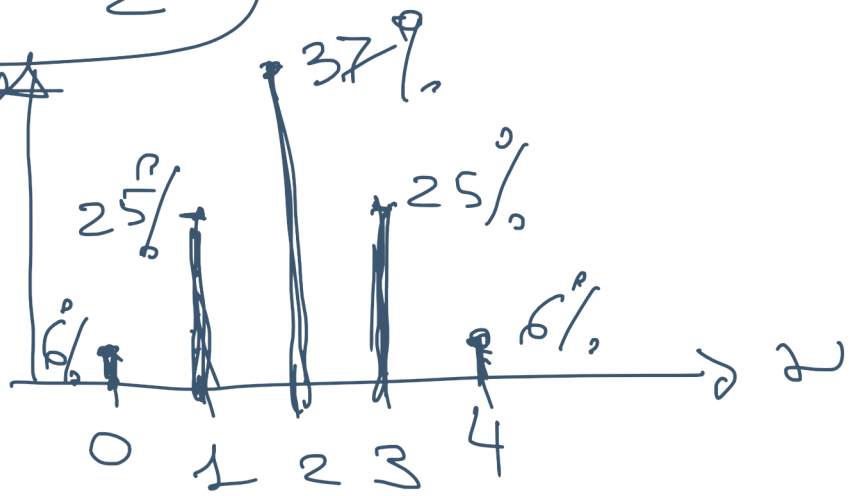
$=0.0625$

$=6.25\%$

$$b_{4,1/2}(1)=\frac{4!}{1!\,3!}\left(\frac{1}{2}\right)^1\left(\frac{1}{2}\right)^3=\frac{1}{16}\cdot 4=\frac{1}{4}$$

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

$$P_{4,1/2}(2)=\frac{4!}{2!\,2!}\cdot\frac{1}{16}=\frac{6}{16}=\frac{3}{8}=0.375$$



$p = 1/6 \qquad n = 3$

$q = 5/6$

$b_{3,1/6}(0) = \frac{6}{1 \cdot 6} \cdot \frac{1}{6} \cdot \left(\frac{5}{6}\right)^3 = \left(\frac{5}{6}\right)^3$

$b_{3,1/6}(1) = \frac{3 \cdot 2}{1 \cdot 2} \cdot \left(\frac{1}{6}\right)^1 \left(\frac{5}{6}\right)^2 = \frac{1}{2} \cdot \frac{5}{6}$

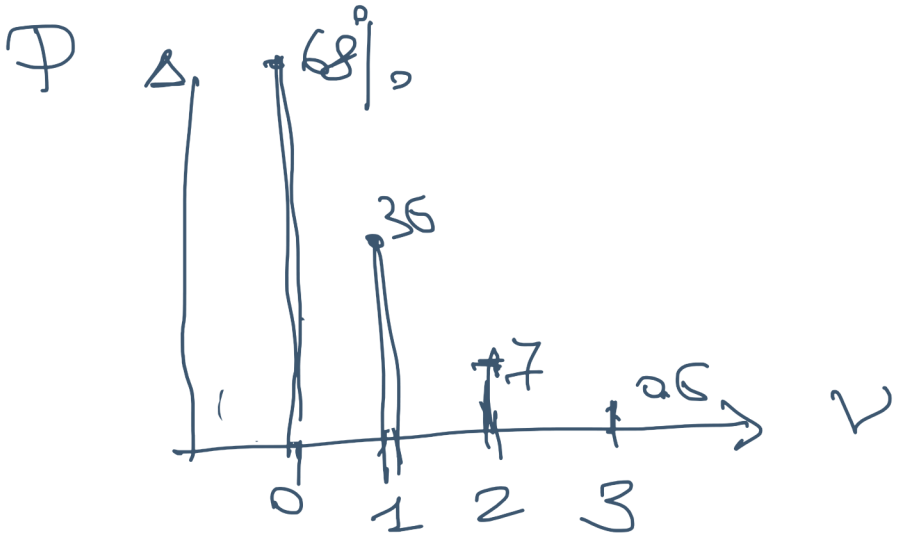
$b_{3,1/6}(2) = \frac{6}{2 \cdot 1} \cdot \left(\frac{1}{6}\right)^2 \cdot \frac{5}{6} = \left(\frac{1}{6}\right)^2 \cdot \frac{5}{2}$

$b_{3,1/6}(3) = \frac{6}{6 \cdot 1} \cdot \left(\frac{1}{6}\right)^3 \cdot \left(\frac{5}{6}\right)^0 = \frac{1}{6^3} \cdot 1$

$b_{n,p}(\nu) = \binom{n}{\nu} p^{\nu} q^{n-\nu}$

$\frac{n!}{\nu!(n-\nu)!}$

$3! = 6 \qquad 2! = 2$




$n=3$ tentativi

$\nu$ successi $0, n$

$p$

$q=1-p$

$p=\frac{1}{6}$ $\quad q=1-\frac{1}{6}=\frac{5}{6}$ $\quad n=3$ $\quad \nu=0,1,2,3$

$P_p(\nu \text{ successi su } n \text{ tentativi}) = b(\nu) =$

$= \frac{n\cdot(n-1)\cdots(n-\nu+1)}{1\cdot 2\cdot\cdots\cdot\nu} \cdot p^\nu q^{n-\nu} = \frac{{}^{n}\Pi_{n-\nu}}{\nu!} p^\nu q^{n-\nu} = \binom{n}{\nu} p^\nu q^{n-\nu}$

$\binom{n}{\nu}$

$\binom{n}{\nu} = \frac{n!}{\nu!(n-\nu)!}$ $\quad n! = 1\cdot 2\cdot 3\cdot\cdots\cdot n$ $\quad 4! = 1\cdot 2\cdot 3\cdot 4 = 24$

$0! = 1$

12/05/2020 (1)

# DISTRIBUZIONE BINOMIALE

3 DADI "1" ASSO "A" 1/6

Probab. 3 A → $\frac{1}{6}\cdot\frac{1}{6}\cdot\frac{1}{6}=\frac{1}{6^3}=0{,}5\%$

2 A

1 A

0 A $\frac{5}{6}\cdot\frac{5}{6}\cdot\frac{5}{6}=\left(\frac{5}{6}\right)^3\sim 58\%$

$\sim 35\%$

A A NOT-A $\frac{1}{6}\cdot\frac{1}{6}\cdot\frac{5}{6}$

A NOT-A A $\frac{1}{6^2}\cdot\frac{5}{6}$

NOT-A A A $\frac{1}{6^2}\cdot\frac{5}{6}$

$=3\cdot\frac{1}{6^2}\cdot\frac{5}{6}=7\%$

A NOT-A NOT-A $\frac{1}{6}\cdot\frac{5}{6}\cdot\frac{5}{6}$

NOT-A A NOT-A $\frac{1}{6}\cdot\left(\frac{5}{6}\right)^2$

NOT-A NOT-A A $\frac{1}{6}\cdot\left(\frac{5}{6}\right)^2$

$=3\cdot\frac{1}{6}\left(\frac{5}{6}\right)^2\sim 35\%$

V