

V. statistiche numeriche (continue)

$$x_1 \quad x_2 \quad x_3 \quad \dots \quad x_n$$

Media - Varianza - Deviazione standard

$$\bar{x} = M = \frac{x_1 + \dots + x_n}{n} \quad \begin{array}{l} \swarrow \text{media} \\ \searrow \text{varianza} \end{array}$$

$$\sigma^2 = \frac{(x_1 - \bar{x})^2 + (x_2 - \bar{x})^2 + \dots + (x_n - \bar{x})^2}{n}$$

$$= \frac{x_1^2 + x_2^2 + \dots + x_n^2}{n} - M^2$$

$$\sigma = \sqrt{\sigma^2} \quad \text{deviazione standard}$$

$$s^2 = \frac{(x_1 - \bar{x})^2 + (x_2 - \bar{x})^2 + \dots + (x_n - \bar{x})^2}{n-1}$$

↑ varianza campionaria

$$s = \sqrt{s^2} \quad \text{d. st. campionaria}$$

Quantili

Chiamo $x_{(1)} \ x_{(2)} \ \dots \ x_{(n)}$ i valori
 $x_1 \dots x_n$ ordinati in ord. crescente

$$\text{Mediana} = \begin{cases} x_{(\frac{n+1}{2})} & \text{per } n \text{ dispari} \\ \frac{1}{2} \left(x_{(\frac{n}{2})} + x_{(\frac{n}{2}+1)} \right) & \text{per } n \text{ pari} \end{cases}$$

Dato $0 \leq p \leq 1$ considero

$$k = 1 + p \cdot (n-1)$$

p -esimo quantile
quantile di ordine p = " $x_{(k)}$ "

Eg. $\frac{1}{2}$ -esimo quantile = mediana

$$k = 5.182$$

$$\begin{aligned} "x_{(k)}" &= x_{(5)} \cdot (1 - 0.182) + x_{(6)} \cdot 0.182 \\ &= x_{(5)} + 0.182 \cdot (x_{(6)} - x_{(5)}) \end{aligned}$$

Quantili

$$Q_1 = \frac{1}{4} - \text{esimo quantile}$$

$$Q_2 = \frac{2}{4} - \text{" " " " = mediana}$$

$$Q_3 = \frac{3}{4} - \text{" " " "}$$

Decili

$$k\text{-esimo decile} = \frac{k}{10} - \text{esimo quantile}$$

Centili 100M

Determinare i quantili di

21 17 14 27 25 18

14 17 18 21 25 27
" " " "
 $x_{(1)}$ $x_{(2)}$... $x_{(6)}$

$$Q_2 = \text{mediana} = \frac{1}{2} \left(x_{\left(\frac{n}{2}\right)} + x_{\left(\frac{n}{2} + 1\right)} \right) = \frac{1}{2} (18 + 21) \\ x_3 \quad x_4 \quad = 19.5$$

$$Q_1 = \frac{1}{4} - \text{esimo quantile} = "x_{(2.25)}" = \textcircled{*}$$

$$K = 1 + \frac{1}{4} (n-1) = 2.25$$

$$\textcircled{*} = x_{(2)} \cdot (1 - 0.25) + x_{(3)} \cdot 0.25$$

$$= 17 \cdot 0.75 + 18 \cdot 0.25 = \underline{\underline{17.25}}$$

14	17	18	21	25	27
"	"				"
$x_{(1)}$	$x_{(2)}$	...			$x_{(6)}$

Distanza interquantile = $Q_3 - Q_1$

F - n. 36 media 164.8 dev.st. 6.3

15		0468899
16		000013334455555778889
17		00115588

M - n. 19 media 180.3 dev.st. 6.8

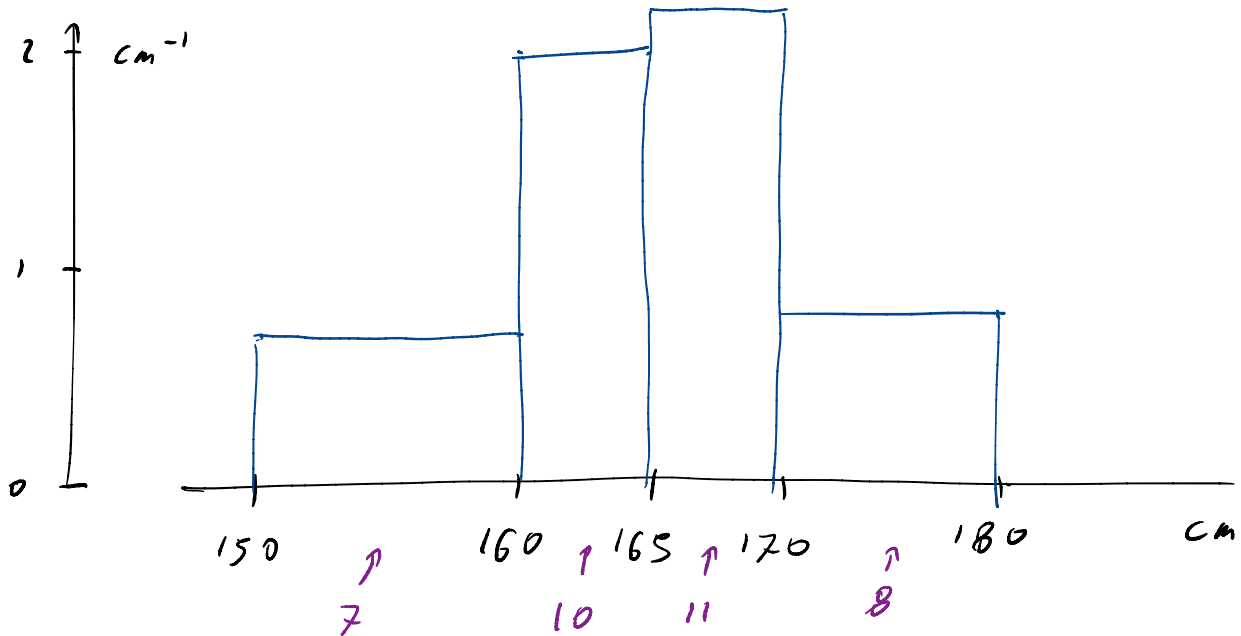
16		9
17		014558
18		0002334456
19		34



Istogrammi:

F - n. 36 media 164.8 dev.st. 6.3

15		0468899
16		000013334455555778889
17		00115588



$$\frac{7}{10} = 0.7 \quad \frac{10}{5} = 2 \quad \frac{11}{5} = 2.2 \quad \frac{8}{10} = 0.8 \quad [\text{cm}^{-1}]$$

densità di frequenza

$$\text{densità di probabilità} = \frac{\text{d. di frequenza}}{n}$$

36 $\nearrow$

