

# Altre variabili aleatorie

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## un paradosso

American Heart Journal

# An Obesity Paradox in Acute Heart Failure: Analysis of Body Mass Index and Inhospital Mortality for 108927 Patients in the Acute Decompensated Heart Failure National Registry

Gregg C. Fonarow, MD; Preethi Srikanthan, MD; Maria Rosa Costanzo, MD; Guillermo B. Cintron, MD; Margarita

Horwich TB, Fonarow GC, Hamilton MA, et al. The relationship between obesity and mortality in patients with heart failure. J Am Coll Cardiol. 2001;38:789-795

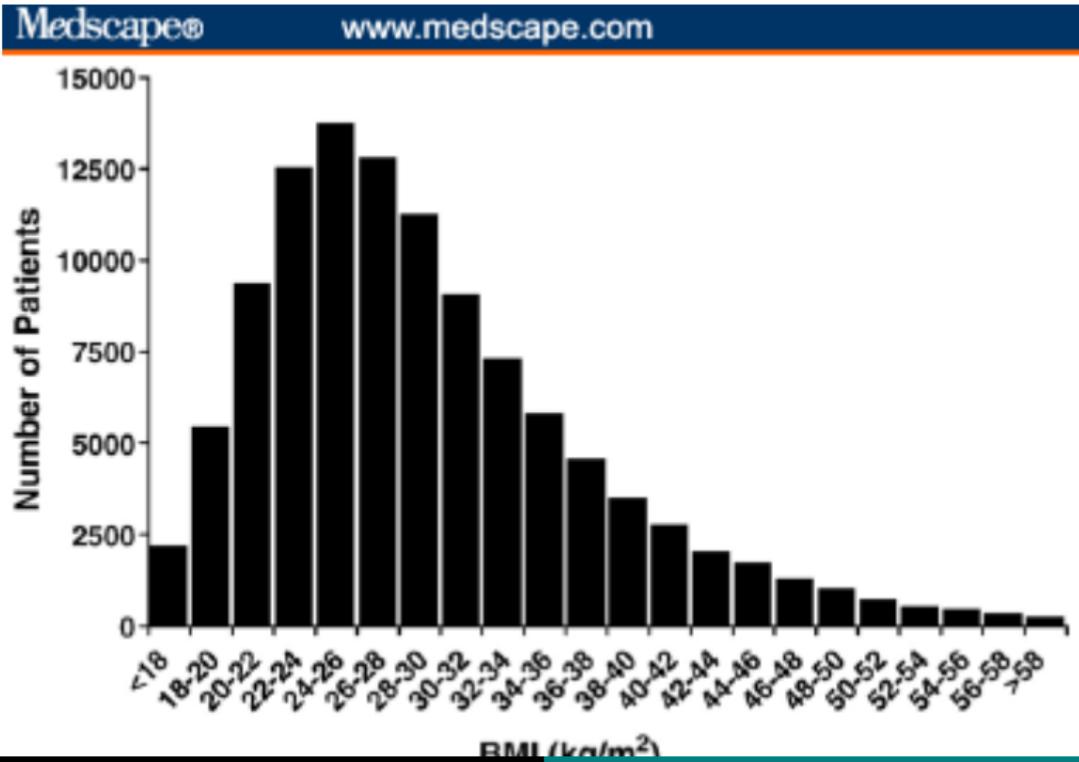
Lavie CJ, Osman AF, Milani RV, et al. Body composition and prognosis in chronic systolic heart failure: the obesity paradox. Am J Cardiol. 2003;91:891-894

Lissin LW, Gauri AJ, Froelicher VF, et al. The prognostic value of body mass index and standard exercise testing in male veterans with congestive heart failure. J Card Fail. 2002;8:206-215

Davos CH, Doehner W, Rauchhaus M, et al. Body mass and survival in patients with chronic heart failure without cachexia: the importance of obesity. J Card Fail. 2003;9:29-35

Curtis JP, Selter JG, Wang Y, et al. The obesity paradox: body mass index and outcomes in patients with heart failure. Arch Intern Med. 2005;165:55-61

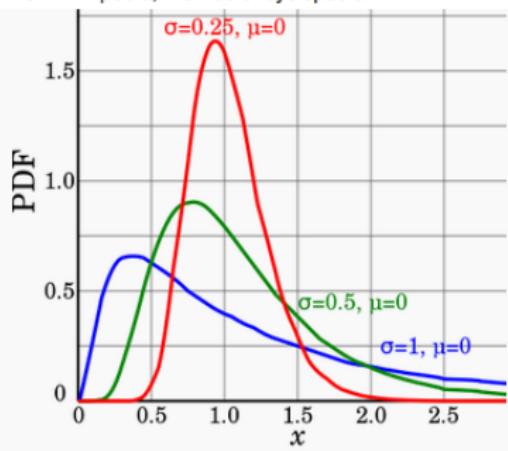
## una distribuzione non normale



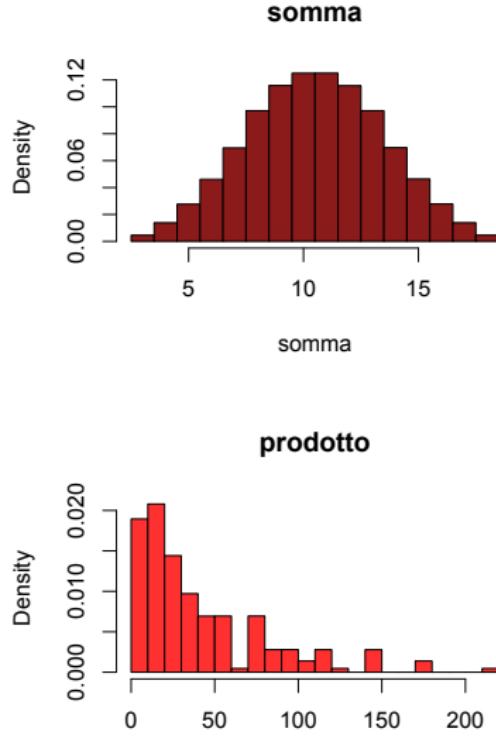


## Log-normal distribution

From Wikipedia, the free encyclopedia



la log-normale  
la binomiale  
la Poisson  
la beta



# la distribuzione log-normale

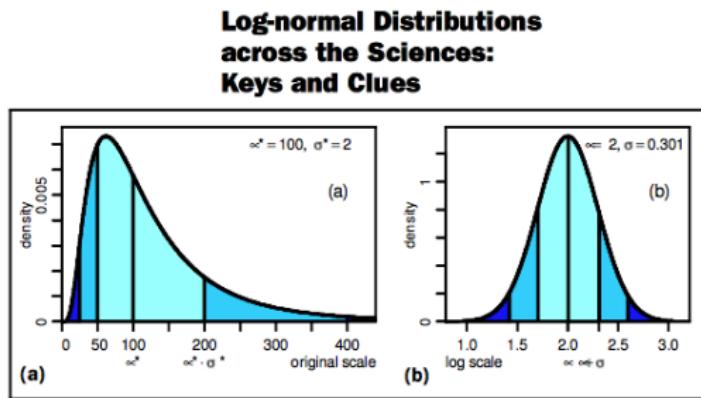


Figure 3. A log-normal distribution with original scale (a) and with logarithmic scale (b). Areas under the curve, from the median to both sides, correspond to one and two standard deviation ranges of the normal distribution.

Eckhard Limpert, et al.

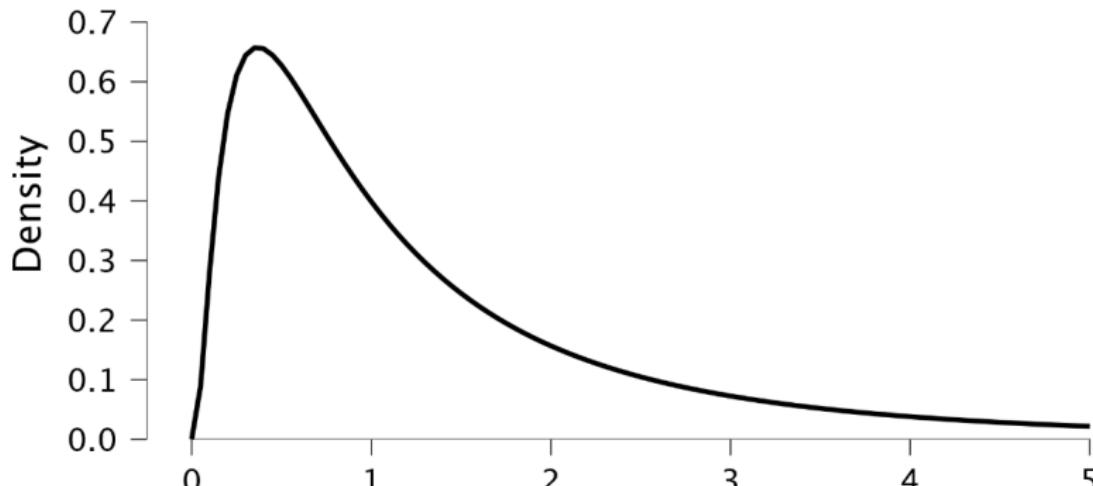
Log-normal Distributions across the Sciences: Keys and Clues

<https://academic.oup.com/bioscience/article/51/5/341/243981>

# la distribuzione log-Normale con JASP

## Probability Density Function

### Density Plot



# la distribuzione log-Normale

## ESERCIZIO

- il dataset magnagraecia.ods
- Statistica Descrittiva
- variabile LDH4
- Split OUTCOME
- Basic Plots
  - Distribution Plots
  - Q-Q Plots

# la distribuzione binomiale



- probabilità di **successo**:  $p$ 
  - probabilità di insuccesso:  $1 - p$
- numero di **prove** (trials):  $n$

# la distribuzione binomiale

<b>Free parameter</b>	<b>Fixed parameter</b>
Probability of success: p <input type="text" value="0.186"/>	Number of trials: n <input type="text" value="210"/>
<b>Display</b>	
<input type="checkbox"/> Explanatory text	
<input type="checkbox"/> Parameters, support, and moments	
<input checked="" type="checkbox"/> Probability mass function	
<input type="checkbox"/> Cumulative distribution function	
<b>Options</b>	
Range of x from <input type="text" value="20"/> to <input type="text" value="60"/>	
<b>Highlight</b>	
<input type="checkbox"/> Mass	<input checked="" type="checkbox"/> Cumulative Probability
Interval <input type="text" value="30"/> $\leq X \leq$ <input type="text" value="50"/>	

## Example (probability)

Suppose that you collect a new sample of 210 women with the same symptoms of those enrolled in `roma`. Obviously, only by chance you will observe exactly '39' malignancies. Can you compute the probability to observe a number of malignancy between 30 and 50?

## la distribuzione binomiale /2

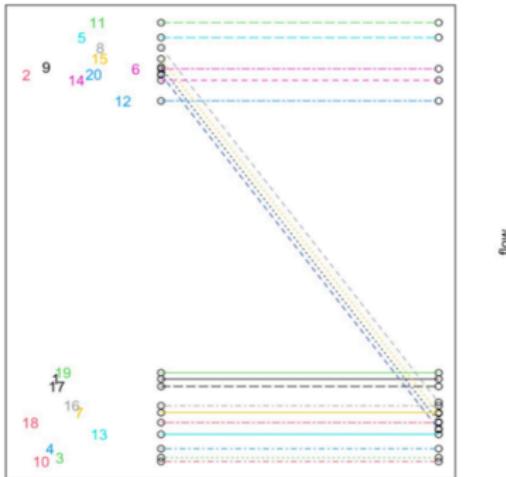
esempio 'difficile', Antonio Cutruzzolà



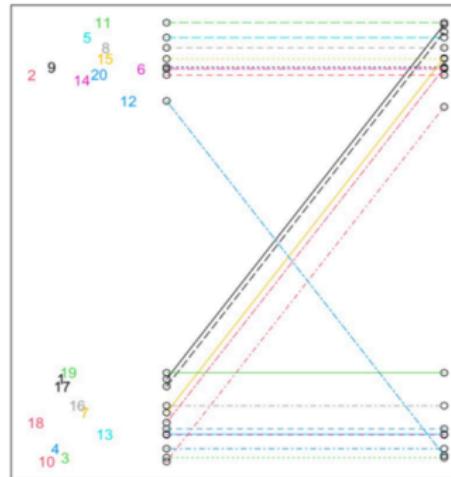
# la distribuzione binomiale /2

esempio 'difficile', Antonio Cutruzzolà

Exercise 1



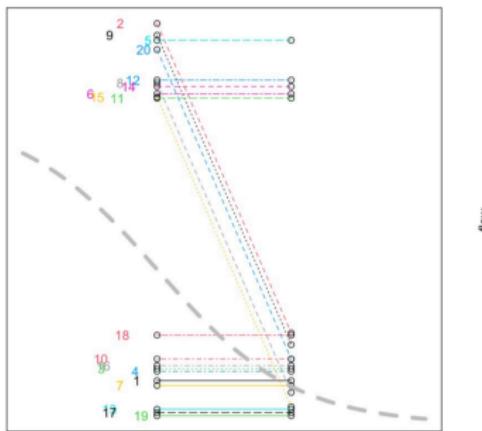
Exercise 2



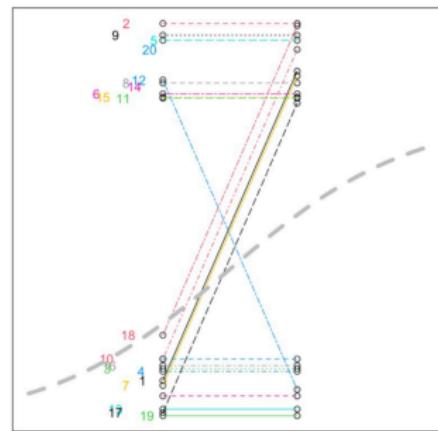
# la distribuzione binomiale /2

esempio 'difficile', Antonio Cutruzzolà

Exercise 1

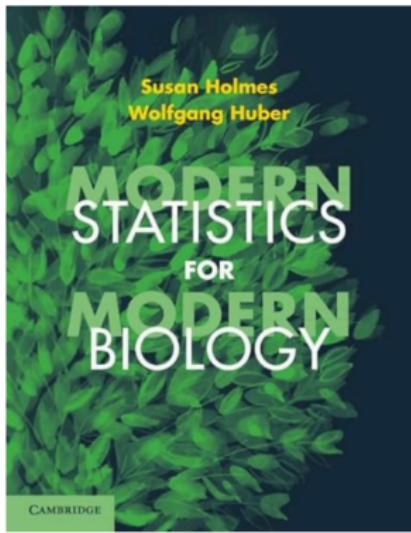


Exercise 2



la log-normale  
la binomiale  
la Poisson  
la beta

# la distribuzione di Poisson



<https://www.huber.embl.de/msmb/>

# la distribuzione di Poisson



1					1	2
2	3	1	2	1		
	1		2		1	
1	1	2		4	1	
1		1		3	1	
	2	1	1			

## Example (probabilità)

Usiamo JASP per scoprire in una distribuzione di Poisson con  $\lambda = 0.37$  quante celle, in probabilità, avranno un valore maggiore o uguale a 2.

# la distribuzione di Poisson /1

▼ Poisson

▼ Show Distribution

Parameter

Rate:  $\lambda$  .37

Display

- Explanatory text
- Parameters, support, and moments
- Probability mass function
- Cumulative distribution function

Options

Range of x from 0 to 5

Highlight

- Mass
- Cumulative Probability

Interval 2  $\leq X \leq$  5

## la distribuzione di Poisson /2

The screenshot shows the R in JASP interface. At the top, there are three tabs: Factor, Distributions, and R (Beta). An orange arrow points from the Distributions tab to the R in JASP window. The window has a title bar "R in JASP". Inside, the console output shows:

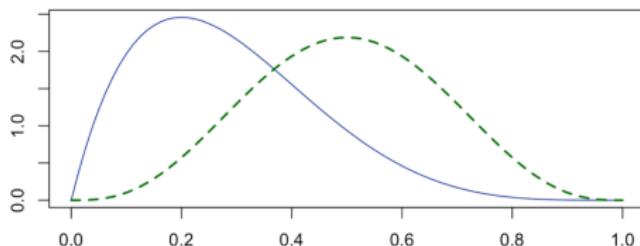
```
Welcome to R in JASP!
> rpois(n = 36, lambda = 0.37)
[1] 0 0 0 1 0 0 0 1 0 1 0 0 0 0 1 0 0 1 1 0 1 0 1 1 0 0 1 0 0 2
0 0 0 0 0 0
```

A yellow callout bubble says: "Pressing Ctrl+Enter or F5 will also run the code". Below the code input field, there are two buttons: "Run Code" and "Clear Output". An orange arrow points from the "rpois(n = 36, lambda = 0.37)" text in the input field to the "Run Code" button.

## la distribuzione beta

- a 'difficult' sample size problem, solved by Monte Carlo

0.025 perc.	0.05 perc.	0.50 perc.	0.95 perc.	0.975 perc.
0.18	<b>0.23</b>	0.5	0.77	0.82
0.04	<b>0.06</b>	0.26	<b>0.58</b>	0.64



- $B(2,5)$ ;  $B(4,4)$