

# Μεθοδολογία της Έρευνας

Εργαστήριο

# Στατιστική Ανάλυση Δεδομένων

- Ποιο είναι το ερευνητικό ερώτημα???
- Τι θέλω να βρώ???
- Τι και ποιες είδους μεταβλητές έχω?
- Ποιες συγκρίσεις μπορώ να κάνω?
- Ποιος είναι ο κατάλληλος στατιστικός έλεγχος?

# Στατιστική Ανάλυση Δεδομένων

- Παρουσίαση Δεδομένων/Μεταβλητών
- Περιγραφική στατιστική
- Μέση Τιμή, Διασπορά, Διάμεσος, Μέγιστη Τιμή, Ελάχιστη Τιμή
- Ιστόγραμμα Συχνοτήτων, Διάγραμμα Πίτας, Θηκόγραμμα κλπ
- Εφαρμογή στατιστικών Ελέγχων, Μοντέλο Παλιδρόμησης κλπ
- Εξαγωγή Συμπερασμάτων

# Λογισμικά Στατιστικής Ανάλυσης

- Excel
- SPSS
- STATA
- R
- Matlab
- και πολλά ακόμη.....

# Γραφήματα Excel

- Γράφημα στηλών
- Γράφημα γραμμών
- Γράφημα πίτας
- Γράφημα διασποράς
- Pivot Chart

Εισαγωγή->Γραφήματα

# Βασικές Συναρτήσεις Excel

# Min-Max-Average

Data		
10		
7		
9		
27		
2		
Formula	Description	Result
=MIN(A2:A6)	Smallest of the numbers in the range A2:A6.	2
Formula	Description	Result
=MAX(A2:A6)	Largest value in the range A2:A6.	27
Formula	Description	Result
=AVERAGE(A2:A6)	Average of the numbers in cells A2 through A6.	11

# Έλεγχος t

- T.TEST(array1,array2,tails,type)
- The T.TEST function syntax has the following arguments:

Array1 Required. The first data set.

Array2 Required. The second data set.

Tails Required. Specifies the number of distribution tails. If tails = 1, T.TEST uses the one-tailed distribution. If tails = 2, T.TEST uses the two-tailed distribution.

Type Required. The kind of t-Test to perform.



# Έλεγχος t

1	Paired
2	Two-sample equal variance (homoscedastic)
3	Two-sample unequal variance (heteroscedastic)

Data 1	Data 2
3	6
4	19
5	3
8	2
9	14
1	4
2	5
4	17
5	1

Formula	Description	Result
=T.TEST(A2:A10,B2:B10,2,1)	Probability associated with a Student's paired t-Test, with a two-tailed distribution.	0.196016

# Έλεγχος $\chi^2$

- CHISQ.TEST(actual\_range,expected\_range)
- The CHISQ.TEST function syntax has the following arguments:
- **Actual\_range** Required. The range of data that contains observations to test against expected values.
- **Expected\_range** Required. The range of data that contains the ratio of the product of row totals and column totals to the grand total.
- The  $\chi^2$  test first calculates a  $\chi^2$  statistic using the formula:

$$\chi^2 = \sum_{i=1}^r \sum_{j=1}^c \frac{(A_{ij} - E_{ij})^2}{E_{ij}}$$

where:

$A_{ij}$  = actual frequency in the i-th row, j-th column

$E_{ij}$  = expected frequency in the i-th row, j-th column

r = number of rows

c = number of columns

A low value of  $\chi^2$  is an indicator of independence. As can be seen from the formula,  $\chi^2$  is always positive or 0, and is 0 only if  $A_{ij} = E_{ij}$  for every i,j.

# Έλεγχος $\chi^2$

Men (Actual)	Women (Actual)	Description
58	35	Agree
11	25	Neutral
10	23	Disagree
Men (Expected)	Women (Expected)	Description
45.35	47.65	Agree
17.56	18.44	Neutral
16.09	16.91	Disagree
Formula	Description	Result
=CHISQ.TEST(A2:B4,A6:B8)	The $\chi^2$ statistic for the data above is 16.16957 with 2 degrees of freedom	0.0003082

# SPSS

Untitled2 [DataSet2] - IBM SPSS Statistics

File Edit View Data Transform **Analyze** Direct Marketing Graphs Utilities Add-ons Window Help

Reports  
Descriptive Statistics  
Custom Tables  
Compare Means  
General Linear Model  
Generalized Linear Models  
Mixed Models  
Correlate  
Regression  
Loglinear  
Classify  
Dimension Reduction  
Scale  
Nonparametric Tests  
Forecasting  
Survival  
Multiple Response  
Simulation...  
Quality Control  
ROC Curve...  
Spatial and Temporal Modeling...

123 Frequencies...  
Descriptives...  
Explore...  
Crosstabs...  
TURF Analysis  
Ratio...  
P-P Plots...  
Q-Q Plots...

1 var var var

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

Data View Variable View

Untitled2 [DataSet2]

File Edit View Data Transform **Analyze** Direct Marketing Graphs Utilities Add-ons Window Help

Reports  
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Nonparametric Tests  
Forecasting  
Survival  
Multiple Response  
Simulation...  
Quality Control  
ROC Curve...  
Spatial and Temporal Modeling...

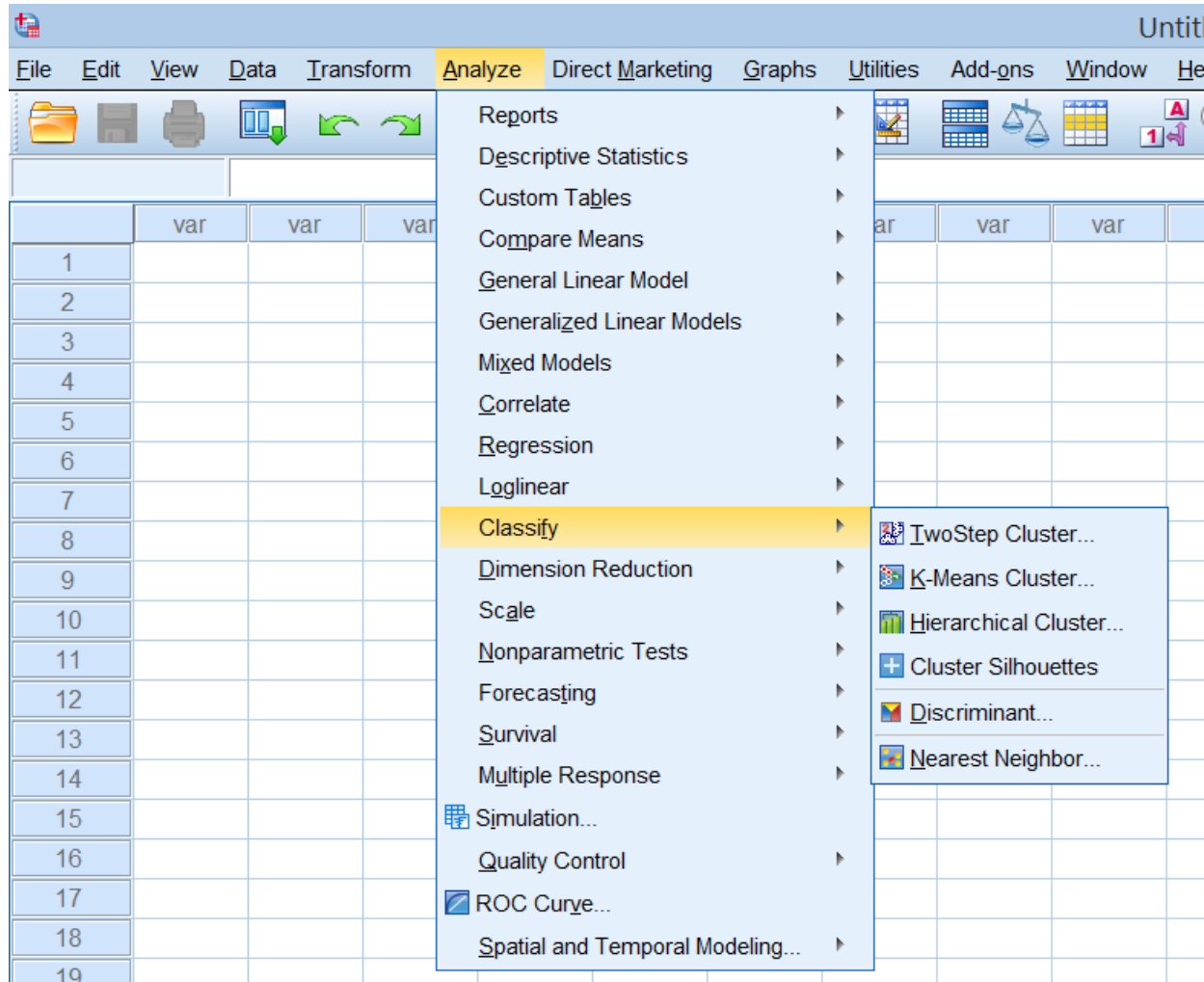
Means...  
One-Sample T Test...  
Independent-Samples T Test...  
Summary Independent-Samples T Test  
Paired-Samples T Test...  
One-Way ANOVA...

1 var var var

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

Data View Variable View

# SPSS

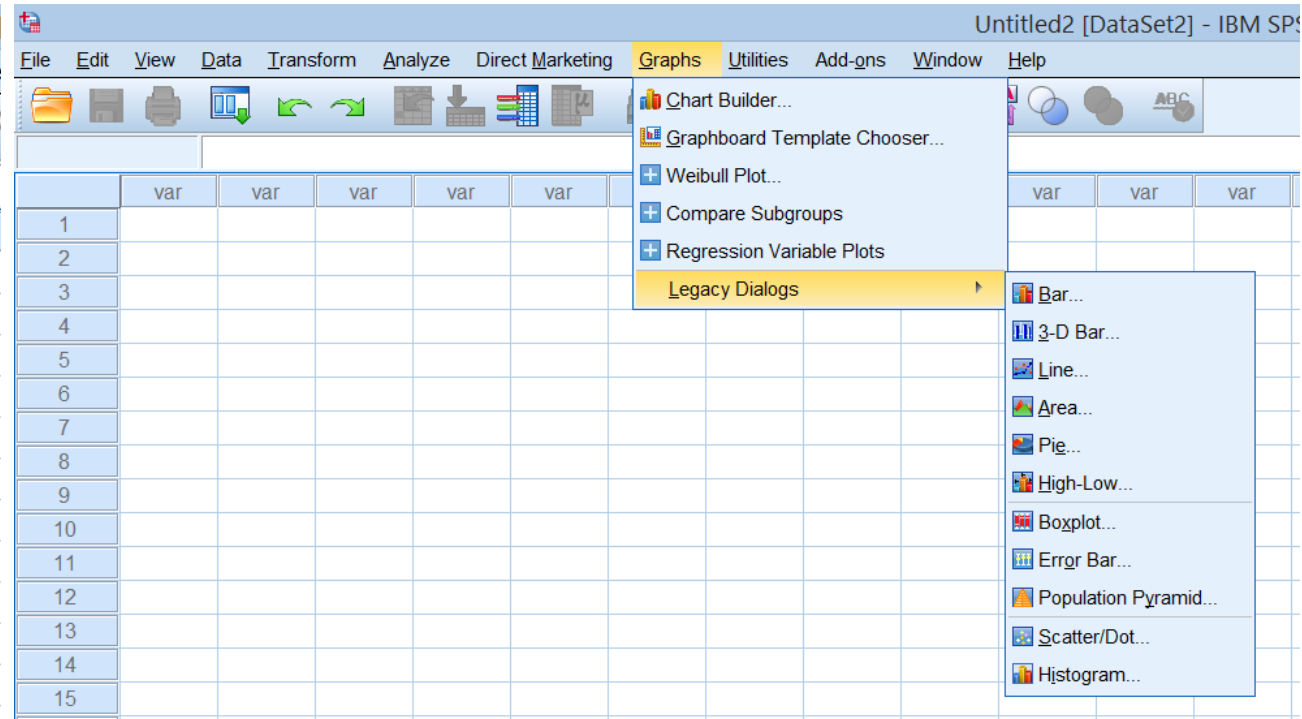


File Edit View Data Transform **Analyze** Direct Marketing Graphs Utilities Add-ons Window Help

Reports  
Descriptive Statistics  
Custom Tables  
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Generalized Linear Models  
Mixed Models  
Correlate  
Regression  
Loglinear  
**Classify**  
Dimension Reduction  
Scale  
Nonparametric Tests  
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Survival  
Multiple Response  
Simulation...  
Quality Control  
ROC Curve...  
Spatial and Temporal Modeling...

TwoStep Cluster...  
K-Means Cluster...  
Hierarchical Cluster...  
Cluster Silhouettes  
Discriminant...  
Nearest Neighbor...

	var	var	var
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			



File Edit View Data Transform Analyze Direct Marketing **Graphs** Utilities Add-ons Window Help

Chart Builder...  
Graphboard Template Chooser...  
+ Weibull Plot...  
+ Compare Subgroups  
+ Regression Variable Plots  
Legacy Dialogs  
Bar...  
3-D Bar...  
Line...  
Area...  
Pie...  
High-Low...  
Boxplot...  
Error Bar...  
Population Pyramid...  
Scatter/Dot...  
Histogram...

	var	var	var	var	var
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					