ΑΡΙΣΤΟΤΕΛΕΙΟ
ΠΑΝΕΠΙΣΤΗΜΙΟ
ΘΕΣΣΑΛΟΝΙΚΗΣ

ΓΕΩΠΟΝΙΚΗ ΣΧΟΛΗ
Α.Π.Θ.

Παραδείγματα: One-way ANOVA

Επιστημονική Επιμέλεια:

Δρ. Γεώργιος Μενεξές

Τομέας Φυτών Μεγάλης Καλλιέργειας
και Οικολογίας

Εργαστήριο Γεωργίας

EXAMPLE 10.1 A Single-Factor Analysis of Variance

Nineteen pigs are assigned at random among four experimental groups. Each group is fed a different diet. The data are pig body weights, in kilograms, after being raised on these diets. We wish to ask whether pig weights are the same for all four diets.

H_0: $\mu_1 = \mu_2 = \mu_3 = \mu_4$.

H_A: The mean weights of pigs on the four diets are not all equal.

$\alpha = 0.05$

Feed 1	*Feed 2*	*Feed 3*	*Feed 4*
60.8	68.7	69.6	61.9
67.0	67.7	77.1	64.2
65.0	75.0	75.2	63.1
68.6	73.3	71.5	66.7
61.7	71.8		60.3

i	1	2	3	4
n_i	5	5	4	5
$\sum_{j=1}^{n_i} X_{ij}$	323.1	356.5	293.4	316.2
$\overline{X}_i$	64.62	71.30	73.35	63.24

The potassium content (mg of potassium per 100 mg of plant tissue) was measured in five seedlings of each of three varieties of wheat.

H_0: $\mu_1 = \mu_2 = \mu_3$.

H_A: The mean potassium content is not the same for seedlings of all three wheat varieties.

$\alpha = 0.05$

Variety G	*Variety A*	*Variety L*
27.9	24.2	29.1
27.0	24.7	27.7
26.0	25.6	29.9
26.5	26.0	30.7
27.0	27.4	28.8
27.5	26.1	31.1

An entomologist is studying the vertical distribution of a fly species in a deciduous forest and obtains five collections of the flies from each of three different vegetation layers: herb, shrub, and tree.

H_0: The abundance of the flies is the same in all three vegetation layers.
H_A: The abundance of the flies is not the same in all three vegetation layers.

$\alpha = 0.05$
The data are as follows (with ranks of the data in parentheses):*

Numbers of Flies/m^3 of Foliage		
Herbs	*Shrubs*	*Trees*
14.0	8.4	6.9
12.1	5.1	7.3
9.6	5.5	5.8
8.2	6.6	4.1
10.2	6.3	5.4

A total of 48 seedlings of the same size were planted at the same time, 12 on each of a building's four sides. The heights, after several years of growth, were as follows:

North	*East*	*South*	*West*
7.1 m	6.9 m	7.8 m	6.4 m
7.2	7.0	7.9	6.6
7.4	7.1	8.1	6.7
7.6	7.2	8.3	7.1
7.6	7.3	8.3	7.6
7.7	7.3	8.4	7.8
7.7	7.4	8.4	8.2
7.9	7.6	8.4	8.4
8.1	7.8	8.6	8.6
8.4	8.1	8.9	8.7
8.5	8.3	9.2	8.8
8.8	8.5	9.4	8.9

The following data are weights of food (in kilograms) consumed per day by adult deer collected at different times of the year. Test the null hypothesis that food consumption is the same for all the months tested.

Feb.	*May*	*Aug.*	*Nov.*
4.7	4.6	4.8	4.9
4.9	4.4	4.7	5.2
5.0	4.3	4.6	5.4
4.8	4.4	4.4	5.1
4.7	4.1	4.7	5.6
	4.2	4.8	

The data are strontium concentrations (mg/ml) in five different bodies of water. First an analysis of variance is performed.

H_0: $\mu_1 = \mu_2 = \mu_3 = \mu_4 = \mu_5$.

H_A: Mean strontium concentrations are not the same in all five bodies of water.

$\alpha = 0.05$

Grayson's Pond	*Beaver Lake*	*Angler's Cove*	*Appletree Lake*	*Rock River*
28.2	39.6	46.3	41.0	56.3
33.2	40.8	42.1	44.1	54.1
36.4	37.9	43.5	46.4	59.4
34.6	37.1	48.8	40.2	62.7
29.1	43.6	43.7	38.6	60.0
31.0	42.4	40.1	36.3	57.3