

List 9

Exercise 1. The average near the ground temperature was examined in three different cities. For each city, 5 measurements [in °C] were obtained, which are shown in the table below:

Cities	I	II	III	IV	V
Warsaw	4.07	4.09	4.06	4.09	4.08
Cracow	4.06	4.08	4.07	4.07	4.07
Gdansk	4.08	4.09	4.08	4.10	4.09

Assuming that the distribution is normal, check at significance level 0.05

- the homogeneity of the variance,
- the equality of the mean temperature value.
- Do Warsaw and Cracow differ significantly from Gdansk in terms of temperature?

Exercise 2. A chemical engineer wants to check whether different pressure conditions have an impact on the average production of a certain product from a given type of raw material. The table below shows the results of the conducted experiment (in g/l):

Pressure	Replications									
Low	28	26	29	30	28	31	26	32	25	29
Moderate	30	29	30	30	28	32	29	32	28	30
Strong	31	29	33	33	29	33	28	32	27	32
High	29	27	30	31	27	32	27	32	27	30

Assuming that the distribution is normal, check at the significance level of 0.05

- the homogeneity of variance,
- the equality of the average production value of a certain product from a given type of raw material.
- Do Low and Strong pressure differ significantly from High with regard to the production of the product?

Exercise 3. The experiment investigated the ash content (non-flammable parts) for eco-pea coal produced on the basis of high-quality coal from five different mines. The following results were obtained (in %):

Objects (mines)	Replications			
M1	6,5	7,8	6,9	6,4
M2	7,2	8,5	7,3	7,0
M3	7,2	7,5	7,1	7,5
M4	7,1	7,0	7,1	7,2
M5	7,2	6,6	7,4	7,5

Assuming that the distribution is normal, check at significance level 0.05

- the homogeneity of variance,
- equality of the value of the average amount of ash for eco-pea coal.
- Do the first and second mines differ significantly from the fifth mine in terms of ash content for eco-pea coal?

Exercise 4. The athlete population has been warned that cigarette smoking delays development. One measure of the effects of smoking on development is the study of the heart's sinus rhythm. An experiment was carried out in which the sinus rhythm of the heart was examined in 24 athletes after a given physical effort of 5 minutes. Results obtained:

Non-smoking	Slightly-smoking	Medium-smoking	Much-smoking
69	91	55	66
52	72	60	81
71	81	78	70
58	67	58	77
59	95	62	57
65	84	66	79

Assuming that the distribution is normal, check at a significance level of 0.05

- the homogeneity of the variance,
- equality of the average sinus rhythm in athletes.