

PROBLEMS FOR EXERCISES IN RANDOM PHENOMENA COURSE - 10TH SET

1. The compressor is fastened to its housing by springs. In this study we examine the influence of the spring stiffness on the transmission of the vibration between the compressor and the housing. The table shows the amplitude of force (in N) measured on the housing for three different types of springs.

spring A	12	17	11	14	10
spring B	16	11	15	13	14
spring C	12	11	10	9	12

Can we claim that the force amplitude measured on the housing is the same regardless on the spring type? Which type of spring ensures minimum force amplitude on the housing? R: Yes ( $f = 2.67$ ,  $p = 0.110$ ). No type is significantly better than the other.

2. In the process of welding in the protection atmosphere we examine the effect of protective gas composition on the tensile strength of the weld. Three different gas mixtures of Ar and CO<sub>2</sub> are tested. The measured tensile strengths of welds are gathered in the table.

A	42	38	37	41	39	40	38
B	36	34	38	35	36		
C	38	39	37	35	36	40	

Can we claim that the protective gas composition significantly affects the tensile strength of the weld? R: Yes ( $f = 5.89$ ,  $p = 0.013$ ).

3. Displacement of the tool tip is measured as a function of tool oil pressure. Measured data is in the table.

Pressure [bar]	50	100	200	300	400	500
Displacement [ $\mu\text{m}$ ]	2.6	5.7	11.8	17.7	23.5	29.4

Is linear function a reasonable description of the dependence between the pressure and the displacement? Determine the coefficients of the corresponding linear function. R: Yes ( $r_{xy} = 1.0$ ).  $y = 0.0594x - 0.238$

4. Measured values of gas pressure at different values of volume are presented in the table below for a given mass of gas.

$V$ [ $\text{m}^3$ ]	0.05	0.06	0.07	0.08	0.12	0.2
$p$ [bar]	10.88	7.22	4.94	4.75	1.82	1.66

Determine the constants  $\kappa$  and  $C$  in the function  $pV^\kappa = C$ . R:  $\kappa = 1.40$ ,  $C = 0.135$ ,  $r_{xy} = -0.953$

NOTE: To solve the problems, tabulated Snedecor probability distribution is required (Tables A.5–8 in the textbook *Opis naključnih pojavov*).