12. seminar

Problem 1

A sociological survey processed data about 360 students: the social origin and the type of school were recorded. The results of the survey are as shown in the table below:

Type of schoole \ Social origin n_{jk}	I	II	III	IV	$n_{j.}$
university	50	30	10	50	140
polytechnic	30	50	20	10	110
economic	10	20	30	50	110
$n_{.k}$	90	100	60	110	360

At the asymptotic significance level 0,05 carry out the test that the variables type of school and social origin are independent. Then determine the degree of association.

Solution

$\frac{n_{1.}n_{.1}}{n} = \frac{140 \cdot 90}{360} = 35$ $\quad \frac{n_{1.}n_{.2}}{n} = \frac{140 \cdot 100}{360} = 38,9$ $\quad \frac{n_{1.}n_{.3}}{n} = \frac{140 \cdot 60}{360} = 23,3$ $\quad \frac{n_{1.}n_{.4}}{n} = \frac{140 \cdot 110}{360} = 42,8$

$\frac{n_{2.}n_{.1}}{n} = \frac{110 \cdot 90}{360} = 27,5$ $\quad \frac{n_{2.}n_{.2}}{n} = \frac{110 \cdot 100}{360} = 30,6$ $\quad \frac{n_{2.}n_{.3}}{n} = \frac{110 \cdot 60}{360} = 18,3$ $\quad \frac{n_{2.}n_{.4}}{n} = \frac{110 \cdot 110}{360} = 33,6$

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Problem 2

Consider 135 applicants for particular university education. Suppose one random variable is the impression upon entrance examination committee and the other random variable is the faculty entrance. At the asymptotic level 0.05 carry out the test that the entrance and the impression are not associated.

entrance \ impression n_{jk}	good	bad	$n_{j.}$
yes	17	11	28
no	39	58	97
$n_{.k}$	56	69	125

Problem 3

Using the data from 12.10 calculate and interpret the odds ratio, construct the asymptotic confidence interval for the theoretic odds ratio and test hypothesis that the faculty entrance and impression upon committee are non-associated.

Problem 4

Conditions of seven patients after particular surgery were assessed by two physicians. The highest score obtained that patient, whose condition was most serious.

patient's index	1	2	3	4	5	6	7
The 1st physician's assessment	4	1	6	5	3	2	7
The 2nd physician's assessment	4	2	5	6	1	3	7

Calculate the Spearman's rank correlation coefficient r_S and at the confidence level 0.05 carry out the test that there is no relationship between considered assessments.