Contingency Tables

Task.1. Students from Poznan University of Economics in the year 2002/2003 passed the exam in Statistics. They got the results shown in the table. Find and interpret the independences between tests' results and age. Accept the level of significance 0.05. Use independence chi-squared test. Find and interpret Czuprow's T coefficient and Pearson C contingency coefficient, Yula coefficient and V Cramer coefficient.

Grades	Students		Summary
	<=25 years	>25 years	
2	40	15	55
3	35	15	50
3,5	15	25	40
4	10	10	20
4,5	10	8	18
5	10	7	17
Summary	120	80	200

Hint:

	Observed				Expected	
Grades	Students		Total	Grades	Students	
	<=25 years	>25 years			<=25 years	>25 years
2	40	15	55	2		
3	35	15	50	3		
3,5	15	25	40	3,5		
4	10	10	20	4		
4,5	10	8	18	4,5		
5	10	7	17	5		
Total	120	80	200			

Cell i	O_i	E_i	$(O_i-E_i)^2$	$(O_i-E_i)^2/E_i$
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
Sum				

Task 2. A shirt manufacturer, which operates three shifts daily, wishes to determine if there are differences in the quality of workmanship between the three shifts. After an inspection of the 600 shirts produced on a particular day, the manufacturer compliled the data in the table, showing the number of "seconds" (shirt with flows) produced by each shift. Do these data indicate that there are differences in the quality of workmanship among the three shifts? Use $\alpha=0.1$.

Find and interpret Czuprow's T coefficient and Pearson C contingency coefficient, Yula coefficient and V Cramer coefficient.

Shirt Condition	Shift			
	1	2	3	Total
Flawed	10	9	11	30
No flaws	240	191	139	570
Total	250	200	150	600

Hint:

Observed				
Shirt Condition	Shift			
	1	2	3	Total
Flawed	10	9	11	30
No flaws	240	191	139	570
Total	250	200	150	600
Expected				
Shirt Condition	Shift			
	1	2	3	
Flawed	…….	10	7.5	
No flaws	237.5	………	………	

Cell i	O_i	E_i	$(O_i-E_i)^2$	$(O_i-E_i)^2/E_i$
1	10	12.50	6.25	0.50
2	240	237.50	6.25	0.03
3	9	10.00	1.00	0.10
4	191	190.00	1.00	0.01
5	11	7.50	12.25	1.63
6	139	142.50	12.25	0.09

Task 3. The Equal Credit Opportunity Act forbids lenders in United States from solicitatingthe marital status of women who are applying for personal loans. Many woman feel that this act should be extended to include the business loans. They cite instances when woman receive business loans only after the lender determined that they were married to men who had good credit ratings (Business Week, 27 May 1985). Suppose that a women's group has collected data on the business loan applications of 600 women, and that the results are as summarized in the accompanying table. Is there evidence of bias on the part of lenders regarding marital status? Use α=0.05.

Find and interpret Czuprow's T coefficient and Pearson C contingency coefficient, Yula coefficient and V Cramer coefficient.

	Loan Granted	Loan Denied
Single	253	119
Married	181	47

Task 4. The trustee of the company's pension plan has solicited the opinions of a sample of the company's employees toward a proposed revision of the plan. A breakdown of the responses is shown in the accompanying table. Is there evidence that the responses differ among the two groups of employees. Test at the 5% level of significance,

	Blue-collar Workers	White-collar workers
For	67	32
Agains	63	18

Statistica

Task 1. On the basis of the data in the file Characteristics.sta find and interpret the independence between the gender and the eye colour and between the eye colour and hair colour.

Accept the level of significance 0.05. Use independence chi-squared test. Find and interpret Cramers's V coefficient and Pearson C contingency coefficient.

Task 2. The researchers randomly selected the sample of men. They examined the tendency to authoritarianism and high ambition. The data are available in the file Striving.sta.

Find out whether the authoritarianism coexists with the high ambition.

Accept the level of significance 0.1. Use the independence chi-squared test. Find and interpret Cramers's V coefficient and Pearson C contingency coefficient.

Task 3. The researchers randomly selected 100 men (age: 50-60 years). They examined the frequency of the disease and high blood pressure. Find out whether the disease coexists with the high blood pressure.

Accept the level of significance 0.02. Use independence chi-squared test.

	No high blood pressure	High blood pressure
Disease	37	17
No disease	8	38

Task 4. The researchers randomly selected smokers from Gdansk (age: 50-60 years). They examined the number of smoked cigarettes and the changes in the lungs. Find out whether the number of smoked ciigarettes coexists with the changes in the lungs.

Accept the level of significance 0.1. Use the independence chi-squared test.

	Non-smoker	Smoker
Change	51	560
No change	370	59