1 Task

a) Within the groups of 31 WI(General Economics)-Students und 33 IBS(International Economics)-Students at the Jade Hochschule a survey obtained an average monthly income of 760 Euro (WI) and 690 Euro (IBS). It is assumed, that the income is normally distributed. Additionally, the variances are equal with $\hat{\sigma}^2 = 10000$. Check, if the incomes differ for a significance-level of $\alpha = 5\%$.

b) A Portfoliomanager claims, that the average risk within the Tech-segment at the stock market is due to the variance of the yields not higher than $\sigma^2 = 10[\%]^2$. For a random sample of 10 stocks, we obtained $\hat{\sigma}^2 = 12[\%]^2$. Decide, if the statemanet of the portfolio manager is true for a significance-level of $\alpha = 5\%$.

Task2

In the last poll in lower saxony, the political party ABC has obtained 100 votes within a random sample of 1250 persons.

a) Calculate an unbiased estimator for the proportion π of votes for ABC within the whole number of voters in lower saxony.

b) Calculate a confidence interval for π for a confidence Level of 95%.

c) Calculate the size of the random sample, if the length of the confidence interval with error probability $\alpha = 1\%$ is 0,02.

Task 3

After an exam in introductory statistics (200 students), the lecturer asked 10 students, how much they have learned for the exam. Together with the marks, we obtain the following table.

Student	Time [days] x	Mark y	xy	x^2	(yhat-ybar)^2	(y-ybar)^2
1	3	3				
2	2	2				
3	6	1				
4	4	4				
5	2	5				
6	4	2				
7	7	2				
8	3	2				
9	4	3				
10	5	2				
Summe	40	26	95	184	3,375	12,4

a) Calculate via linear regression the parameters a and b from the functional form y=a+bx and an unbiased estimator for the true variance of the parent distribution.

b) Calculate the correlation coefficiant and the unexplained variance.

c) Due to the regression, which mark should be achievable if a student learns 2 weeks? Discuss the result.

Task 4

Within a market survey after holidays ended 4000 persons were asked about their preferences with respect to destination A and B. We obtained the following data:

	good	indifferent	bad
Destination A	800	200	900
Destination B	1260	540	

Contigency table			
	good	indifferent	bad	rel. cum. Prob.
Destination A				
Destination B				
rel. cum. Prob.				

Theo. prob. for independency		
	good	indifferent	bad
Destination A			
Destination B			

a) Calculate the relative probabilities and the relative cumulative probabilities.
b) Calculate the theoretical relative probabilities if both attributes are independent.
c) Test the two variables for independence for $\alpha = 1\%$.