Assignment 1 (30%)
Life expectancy (in days) of an electronic component *X* has the following density function

$$f(x) = \begin{cases} 0 & for\ x \leq 10 \\ cx^{-2} & for\ x > 10 \end{cases}$$

a) What is the cumulative distribution function of *X*?
b) Find P(X > 20)
c) Compute the expected value of *X*
d) What is the probability that of 6 such types of components at least 3 will function for at least 15 hours? Please state any assumptions that need to made.

Assignment 2 (15%)
A large IT company must have a total of 550 working laptops at anytime. If a laptop is not working, the company must replace it immediately. The laptops are known to have a break-down rate of 2%. Each laptop that is replaced costs the company a total of €1,000.

a) How much money should the company reserve in order to pay for the expected number of laptop replacements?
b) What is the probability that the amount found in (b) will not be enough?
c) How much money should the company reserve if it wants to be 95% certain that they have enough money to replace the laptops?

Assignment 3 (10%)
The probability that a regularly scheduled flight departs on time is 0.81; the probability that it arrives on time is 0.80; and the probability that it departs and arrives on time is 0.76. Find the probability that a plane arrives on time, given that it did *not* depart on time

Assignment 4 (15%)
Engineers at a large automobile manufacturing company are trying to decide whether to purchase brand A or brand B tires for the company's new models. To help them arrive at a decision, an experiment is conducted using 12 of each brand. The tires are run until they wear out. The results are as follows:

Brand A :	Mean = 37,900 kilometers
	Standard deviation = 5100 kilometers.
Brand B :	Mean = 39,800 kilometers
	Standard deviation = 5900 kilometers.

The company uses this data to conduct a hypothesis test to determine whether tire B lasts significantly longer than tire A.

a) Which assumptions must be made in order to conduct this test?
b) What is the p-value for the test? Please state with four significant figures.
c) Explain what the p-value found in b means and express it as a conditional probability.

Assignment 5 (10%)

The Danish Society of Engineers, IDA, recently conducted a survey to determine income among their members. They divided their members into to two groups: those employed in companies based in Jutland and those employed in companies based on the islands. The samples consisted of 26 companies in Jutland and 37 companies on the islands. The average income between the two groups of companies where almost the same, but the standard deviations were noticeably different with a sample standard deviation in Jutland of 13,729 and 11,003 in the islands. Both samples proved to be fairly normally distributed. Setup an appropriate hypothesis test to determine whether the standard deviations of the two groups differ significantly and state the p-value for the test.

Assignment 6 (20%)

The table below displays the average daily maximum stress for a power plant as a function of the maximum outdoor temperature, measured over a period of 10 days.

Max temperature	Max stress
35	21.4
28	15.2
32	15.6
27	12.9
37	25.4
38	26.6
34	21.0
35	20.4
34	21.3
31	15.0

a) Plot the data into a scatterplot to confirm suspicion of correlation and plot the residuals in a normal probability plot to determine whether they may be assumed to be normally distributed.
b) Calculate the error sum of squares and the total sum of squares and use these to determine the regression sum of squares
c) Use the method of least squares to estimate the regression coefficients and setup 95% confidence intervals for these estimates
d) Use the error sum of squares and the total sum of squares to determine the coefficient of determination and use this result to derive the correlation coefficient. Comment on both coefficients.
e) Setup a 95% prediction interval for a max temperature of 30 degrees.