Assignment 1 (20%)
Life expectancy (in days) of an electronic component has the following density function

$$f(x) = \begin{cases} 0 & for\ x < 1 \\ \dfrac{1}{x^2} & for\ x \geq 1 \end{cases}$$

  a) What is the probability that a component lasts between 0 and 1 day?
  b) What is the probability that a component lasts between 0 and 10 days?
  c) What is the probability that a component lasts for more than 10 days?
  d) Find the cumulative distribution function for the life expectancy of the electronic component.

Assignment 2 (15%)
An insurance company has 1000 male life insurance customers who are 62-65 years of age. For each of the males in this demographic that die within the next year, the company must pay 1 million DKK. It is known that the mortality rate within this demographic is 1.5%.

  a) How much money should the company reserve in order to be able to payout the expected amount of life insurance money?
  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 pay the life insurance money? Hint: You need to use the inverse of the distribution in question.

Assignment 3 (15%)
The probability that a regularly scheduled flight departs on time is 0.83; the probability that it arrives on time is 0.82; and the probability that it departs and arrives on time is 0.78. Find the probability that a plane

  a) Arrives on time, given that it departed on time
  b) Departed on time, given that it has arrived on time
  c) Arrives on time, given that it did not depart on time

Assignment 4 (10%)
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.

Is there sufficient evidence to support the claim that there is no difference in the average wear of the two brands of tires? Assume the populations to be approximately normally distributed.

Assignment 5 (10%)

An urban community would like to show that the incidence of breast cancer is higher in their area than in a nearby rural area. (PCB levels were found to be higher in the soil of the urban community.) If it is found that 20 of 200 adult women in the urban community have breast cancer and 10 of 150 adult women in the rural community have breast cancer, can we conclude at the 0.05 level of significance that breast cancer is more prevalent in the urban community?

Assignment 6 (30%)

In a certain type of metal test specimen, the normal stress on a specimen is known to be functionally related to the shear resistance, where the latter is the dependent variable. The following is a set of coded experimental data on the two variables:

Shear Resistance	Normal Stress
26.5	26.8
27.3	25.4
24.2	28.9
27.1	23.6
23.6	27.7
25.9	23.9
26.3	24.7
22.5	28.1
21.7	26.9
21.4	27.4
25.8	22.6
24.9	25.6

a. Create a **complete** regression analysis of the data above. Your analysis must include a plot of the data, estimates for the regression parameters and confidence intervals for these, considerations about the assumptions of the model, as well as an assessment of the adequacy of the model.

b. Setup a 95% prediction interval for the predicted value corresponding to a stress level of 30.