Exercise 1

To test whether the recovery time from influenza with a new vaccine depends on sex, a sample of 236 patients (115 men and 121 women) was taken and the recovery time of each patient was measured. The following table shows the frequencies of the times.

Time (days)	Men	Women
2-3	20	34
3-4	31	27
4-5	24	19
5-6	5	12
6-7	17	6
7-8	15	17
8-9	3	6

Answer justifying:

a) In which group is the average recovery time more representative, that of men or that of women? Justify your answer.
b) Could we ensure that the sample of women comes from a normal population considering their asymmetry and kurtosis?
c) Construct the box-and-whiskers plot for the men distribution, has the distribution any outlier?
c) If it is determined that the 20% of men who took the longest to recover would need a further study to find the cause of their slow recovery, from what recovery period would they enter that study?
d) Who would recover relatively sooner within their group, a man in 4 days or a woman in 5 days?

Use the following sums for calculations:

Men:

$\sum x_i\, n_i$= 542.5 days, : $\sum x_i^2\, n_i$= 2920.75 days^2,

$\sum(x_i - \bar{x})^3 n_i$= 310.015 days^3, $\sum(x_i - \bar{x})^4 n_i$= 2238.642 days^4.

Women:

$\sum x_i\, n_i$= 548.5 days, : $\sum x_i^2\, n_i$= 2934.25 days^2,

$\sum(x_i - \bar{x})^3 n_i$= 559.579 days^3, $\sum(x_i - \bar{x})^4 n_i$= 3515.069 days^4.

Exercise 2

The effect of a doping substance on the response time to a given stimulus was analyzed in a group of patients. The same amount of substance was administered in successive doses, from 10 to 90 mg to all patients. The following table shows the average response time to the stimulus, expressed in hundredths of a second.

x: Doses (mg)	10	20	30	40	50	60	70	80	90
y: Time (10^{-2} seg)	23	41	63	80	102	110	130	156	171

a) Using the sums provided, calculate the means, variances, and covariances of the dose (x) and the response time (y).

b) Draw the linear regression line of the response time (y) as a function of the administered dose (x). According to the linear regression model, how much will the response time increase or decrease for each mg that we increase the dose?

c) Use the linear regression model to predict the expected response time for a dose of 100 mg

d) Draw the linear regression line of the administered dose (x) as a function of the response time (y). If a response time greater than one second is considered dangerous for health, at what dose level should the administration of the doping substance be regulated, or even prohibited?

e) Calculate the linear regression coefficient and interpret the result. Are both predictions equally reliable? Why?

Use the following sums for calculations:

$\sum x_i = 450$ mg; $\sum x_i^2 = 28500$ mg^2

$\sum y_j = 876$ (10^{-2} sec); $\sum y_j^2 = 105560$ (10^{-2} sec)^2,

$\sum x_i\, y_j = 54810$ mg·(10^{-2} sec)