Exercise 22

Consider the data set `cabbages` in the package `MASS`. Assume that the Ascorbic acid content of both varieties is normal distributed. Investigate whether the Ascorbic acid content differs between the two varieties with an appropriate statistical test (at significance level $\alpha = 0.05$). Write down the corresponding Null- and Alternative hypothesis as well.

Exercise 23

Load the data set `knie.txt` into R. Investigate whether the therapy group (`TH = 1`) and the placebo group (`TH = 0`) exhibit significantly different properties regarding `PAIN` with an appropriate statistical test (at significance level $\alpha = 0.05$). Write down the corresponding Null- and Alternative hypothesis for your chosen test. Discuss also different possibilities to test above hypothesis.

Exercise 24

The coach of an amateur football team measures the sprinting times of the players on 100 meters. He observes the following (in seconds):

Player	1	2	3	4	5	6	7	8	9	10	11
Sprinting time	15.1	14.3	14.4	13.1	12.9	13.8	11.7	12.8	14.1	13.6	14.2

In his opinion the players are to slow, therefore he schedules an extra training in sprinting for the players. After 2 weeks he measures the sprinting times of his players again, and now observes (in seconds):

Player	1	2	3	4	5	6	7	8	9	10	11
Sprinting time	14.9	14.2	14.5	13.1	12.6	14.0	11.7	12.3	13.8	13.7	14.0

Assess the success of the sprinting training by investigating with an appropriate statistical test (at significance level $\alpha = 0.1$) whether the players improved their sprinting times (on average) after the additional training, where you can assume that the sprinting times of the players are normal distributed. Write down the corresponding Null- and Alternative hypothesis as well.

Exercise 25

A survey to compare ready-mixes for cake types A, B and C is conducted. Within the survey 148 persons where (randomly) assigned to 3 approximately equal-sized groups, receiving probes of cake type A, B, or C, respectively. The test persons where asked afterwards, whether they liked the cake they tested (Response +) or disliked it (Response −). The following table shows the resulting (absolute) frequencies in answers:

	Response +	Response −
Cake A	21	29
Cake B	30	19
Cake C	25	24

The conductors of the survey wish to investigate whether there is a significant relationship between the type of ready-mix and the acceptance by the testers (at significance level $\alpha = 0.05$). Write down the corresponding Null- and Alternative hypothesis, and analyze the given data with an appropriate statistical test.