Exercises for the course

"An introduction to R"

Sheet 10

Exercise 50: Calculate

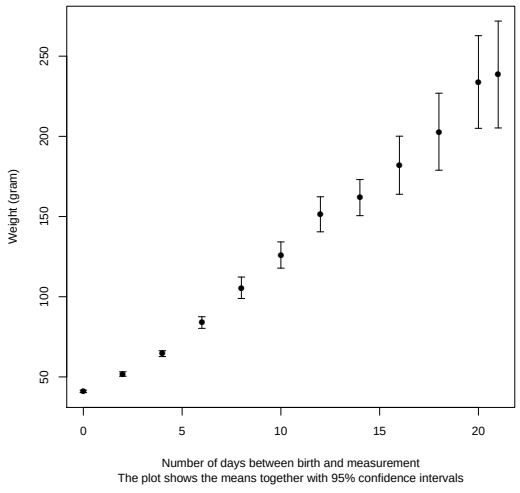
- exp(5),
- the sum $\sum_{i=1}^{100} i^3$,
- the probability of a standard normally distributed random variable being less than or equal to 1.

Exercise 51: *Apply functions directly to vectors if possible. If this is not possible, then apply() and its relatives might help to avoid slow loops.*

- Use the command `lapply()` to apply the function `sqrt()` to each element of the vector `1:9`. Repeat this with `lapply()` replaced by `sapply()` and compare the output of the two commands. (Of course `sqrt(1:9)` does the same.)
- Define the variable `line` to be a vector which increases from 0 to 1 and has 1000 elements. Generate 1000 values with `rnorm()` and add `line`. Denote the resulting vector as `x`. Then generate a factor named `groups` with 10 levels and total length 1000 with the command `gl()`. Calculate the mean of `x` for each level in `groups`. Plot the resulting vector of means.

Exercise 52: Recall the data set `rent`. Someone claims that the average net rent per square meter was 8.40 in Munich in 2003. Test this with the one-sample t-test. What is the p-value of this t-test? Calculate the mean of `nmqm`.

Exercise 53: Recall the ChickWeight data from Exercise 26. Define a subvector `weight4` of `weight` corresponding to Diet 4. As in Exercise 26 calculate the mean of `weight4` for each day. In addition calculate the confidence intervals for these means. Represent the confidence intervals through vectors `top4` and `bot4` which contain upper and lower interval boundaries. Plot the vector of means and the confidence intervals using the command `errbar()` from the library `sfsmisc`. Your result should resemble the following figure.



Hint: The point character used for `errbar()` is 16 in this plot. (4 points)

Exercise 54: Recall the Chill Coma Recovery Time (CCRT) data set from. Load the data into the variable `data.ccrt` and copy it into the search path. Calculate the sample mean and the sample standard deviation of `ccrt`. Then caculate the sample mean and the sample standard deviation for the two subvectors of `ccrt` corresponding to flies from Bangkok and Kathmandu, respectively. Is the difference of these two means significantly different from zero? Choose a suitable test and justify its usage. Furthermore check with a one sample test that both sample means are significantly different from `mean(ccrt)`.