L1. Descriptive Statistics, Distributions, Sampling

The data are located at http://edu.modas.lu/data

1. For **beer** data (a) Build a cross-tabulation or pivot table (`table`) for men's and women's beer preferences. (b) Transform the pivot table into a relative frequency table (probabilities) for men and women (`prop.table`). (c) Illustrate your findings using a plot (`barplot`).

2. Based on the **cancer** data set, calculate the mean (`mean`) and median (`median`) survival time for men and women (Male=1 Female=2) subpopulations. You can also use the `summary` function. *Note*: focus on dead patients (censoring status 1=censored, 2=dead).

3. For the **rana** data: (a) Calculate Pearson's and Spearman's correlations (`cor`) between the temperature and heart rate of a frog. (b) Illustrate by a scatter-plot (`plot`)

Work with **mice** data:

4. Calculate the mean *Ending weight* of male and female mice (separately for each sex).

5. Consider the 50 heaviest mice in the group. Build and draw the frequency distribution for their sex. You can use functions: `order`, `sort`, `barplot`, `pie`

6. Estimate the probability that a randomly selected mouse is lighter than 20 grams. You can use `sum` or `mean` applied to TRUE/FALSE vectors

7. Estimate the probability that a randomly selected mouse has a bleeding time bigger than 1 minute.

8. Provide a summary of the *Bone mineral density* of all mice.

9. Draw the distribution of *Bone mineral density*

10. Based on *Weight change*, do you have any potential outliers? If so, provide the IDs of suspicious mice. Now try with Iglewich-Hoaglin's method.

11. The volume of a liquid in bottles of one company is distributed normally with an expected value of 0.33 liter and a standard deviation of 0.01.
    a. Based on your knowledge about normal distribution, estimate the probability (`pnorm`) of buying a bottle containing less than 0.32 liters of the liquid.
    b. Estimate the interval in which the volumes of 95% bottles are lying (many correct solutions exist, as the question is incomplete!) (`qnorm`)

12. A population of marine gastropods has shell lengths that are normally distributed (`pnorm`) with mean μ = 7 mm and variance σ^2 = 2.25 mm^2. What proportion of the population will have a shell length between 5.5 mm and 8.5 mm?

13. Test the central limit theorem ☺ Generate *k* random uniform random vectors with 1e4 elements (`runif`) and build their distributions for k = 1, 2, 6, 12