Exercises

1. An educational researcher was interested in the effect of academic performance in high school on academic performance in college. She consulted the school records of 12 college graduates, all of whom had attended the same high school, to determine their high school cumulative grade average (X) and their cumulative grade average in college (Y). The following results were obtained:

X	3.3	2.9	2.5	4.0	2.8	2.5	3.7	3.8	3.5	2.7	2.6	4.0
Y	2.7	2.5	1.9	3.3	2.7	2.2	3.1	4.0	2.9	2.0	3.1	3.2

(a) Calculate the regression slope and Y-intercept.
(b) Draw the regression line on the scatter plot of the data.
(c) Predict the college grade average of a student who attains a 3.0 grade average in high school.
(d) Find the coefficient of determination and non-determination. What do they mean?
(e) Perform an *t* test of the significance of the regression.
(f) Draw scatter plot of college grade average versus high school with fitted line and residual line segments.

2. Analyze and interpret the effect of explanatory variables on the milk intake in the kfm{ISwR} data set using a multiple regression model. Notice that sex is a factor here; what does that imply for the analyses?

3. The sex of most turtles is determined after fertilization. The temperature of the developing eggs is what decides whether the offspring will be male or female.

The sex of turtles

Temp	male	female	% male	Temp	male	female	% male
	1	9	10%		7	3	70%
27.2	0	8	0%	28.4	5	3	63%
	1	8	11%		7	2	78%
	7	3	70%		10	1	91
27.7	4	2	67%	29.9	8	0	100%
	6	2	75%		9	0	100%
	13	0	100%				
28.3	6	3	67%				
	7	1	88%				

(a) Using logistic regression analysis, test whether there is a causal link between the male ratio and temperature and find logit(P).
(b) Evaluate odds ratio and 95% CIs for the association between the male ratio and temperature.
(c) Plot the fitted probability for male ratio versus temperature.

Exercises

4. In a survey carried out in 1974/1975 each respondent was asked if he or she agreed or disagreed with the statement "*Women should take care of running their homes and leave running the country up to men*".

`womensrole` {HSAUR3} *Womens Role in Society*

Data from a survey from 1974 / 1975 asking both female and male responders about their opinion on the statement: Women should take care of running their homes and leave running the country up to men.

A data frame with 42 observations on the following 4 variables.

`education` years of education.

`gender` a factor with levels `Male` and `Female`.

`agree` number of subjects in agreement with the statement.

`disagree` number of subjects in disagreement with the statement.

(a) Do responses differ by gender and years of education? Use logistic regression. (Hint: Refer to the reference at: https://tinyurl.com/y5xx9jqm)

(b) Plot the fitted and observed probabilities of agreeing on the stated women's role based on the survey results.