Exercise 20

In this exercise we will study data from an experiment where one wanted to assess the toxicity of the substance rotenone. Groups of about 50 insects were exposed to various doses of rotenone, and the number of insects that died at each dose level was recorded. The data are available at the course web-page.

The variables in the data set are coded as follows:
- `LOGDOSE`   Logarithm of the concentration of rotenone (base 10 logarithm)
- `NUMBER`   Number of insects in total
- `DEAD`   Number of insects that died

a) Compute the proportion of insects that died at each dose level and make a plot of the proportions versus dose of rotenone.

b) Fit a suitable regression model for the relation between the proportions of insects that died and the doses of rotenone. Give the reasons for your choice of regression model and interpret the fitted model.

c) Assess the fit of the model by including the fitted proportions on the plot from question a. Also give a formal goodness-of-fit test.

d) Use the fitted model to estimate LD50, i.e. the dose required to kill half the members of a tested population.