Week 15 homework problems

1. Use the data described in problem **12.1**. Do the following:

   a. Create a table that gives the number of trees that survived and the number that died of each of the nine species.

   b. Create a scatter plot that puts the proportion of deaths in each species on the y-axis and the logarithm of average diameter on the x-axis. You can get the surviving proportion in each species using

   ```
   aggregate(Blowdown$y,by=list(Blowdown$spp),FUN=mean)$x
   ```

   and the average diameter using

   ```
   aggregate(Blowdown$d,by=list(Blowdown$spp),FUN=mean)$x
   ```

   Comment on whether the sigmoid curve of logistic regression appears to fit the data in your scatter plot.

   c. Fit the logistic regression model to the raw data using log(`d`) as the regressor. Draw the effects plot of the fitted model.

   d. Using the fitted model, give an interpretation of the coefficient for log(`d`).

   e. Add $(\log(\texttt{d}))^2$ to the mean function from the fitted model to allow for a possible decline in the probability of blowdown for the largest trees. Obtain the likelihood ratio test for the hypothesis that the quadratic term is 0 and interpret its result. (You might want to fit the quadratic model using `I(log(d)^2)` instead of `poly(log(d),2,raw=TRUE)`).

2. Do problem **12.8**. When the problem says "summarize results", predict the probability of death of a tree with diameter 21 cm and local severity measure 0.5.

3. Use the data described in problem **12.9**. Do the following:

   a. Fit the poisson regression model with `sex`, `citizen`, and `type` as predictors and `count` as the response. Interpret the estimated coeffecient for each regressor.

   b. Perform a goodness-of-fit test on the model using residual deviance. Interpret the test's result.