Assignment 9
Due: Thursday, April 28

1. The course website contains a data set, `abomb.txt`, with information on the number of cancer deaths among survivors of the atomic bombs dropped on Japan during World War II. The variables in the data set are:

   - `Exposure`: Estimated exposure to radiation (in rads)
   - `Years`: Years after exposure (categorized)
   - `Deaths`: Number of cancer deaths
   - `PersonYears`: Person-years at risk

   (a) Assuming that the effect of exposure is linear on $\log(\lambda)$, fit a Poisson regression to the data and calculate an adjusted (for time after exposure) rate ratio for the effect of a 100-rad increase in radiation exposure.

   (b) Calculate a confidence interval for the rate ratio in part (a). Say whether it is a Wald confidence interval or a likelihood ratio confidence interval.

   (c) Carry out a hypothesis test of the null hypothesis that radiation exposure has no effect on the rate of cancer deaths. Interpret your result.

   (d) Plot the influences of the observations. Are any points highly influential to the fit of the model?

   (e) Does the assumption of log-linearity seem to hold? Investigate other possible relationships and report which way you think is the best way to model the data and why.

   (f) For the relationship you chose in (e), make a plot of the relationship between radians and rate of cancer deaths per 10,000 person-years.

   (g) Does there seem to be an interaction between exposure and years following exposure? Perform a hypothesis test and interpret the result. If there is an interaction, briefly describe it.