Part 1. Homework 3: Poisson Regression

Write a report that contains the results of the computations that you are asked to carry out below, as well as the explanation of what you are doing. The main text should include pieces of source code and graphical and numerical output. Upload your answers in a .pdf document (use LaTeX or R Markdown, for instance), as well as the source code (*.R or *.Rmd, for instance). Your work must be reproducible.

1. Generalized Linear Model for UFO data

A database, compiled by the UFO's National UFO Reporting Center, is available on UFO sightings in the United States in this millennium (till 2014).The database has a total of 52,813 reported sightings grouped into 20,984 observations, these have been classified according to 5 variables:

- `State`: USA State where the UFO was sighted. (50 states)
- `Period`: Period of five years when it was sighted. (1: 2000-2004, 2: 2005-2009, 3: 2010-2014)
- `Month`: Month of the year when it was sighted. (1:12)
- `Weekday`: Day of the week when it was sighted (1: 7)
- `Hour`: Time of the day when it was sighted. (1: 00-05, 2: 06-11, 3: 12-17, 4: 18-23)
- `Sights`: Number of sights recorded.

1. Do the Exploratory Data Analysis for this dataset. Explain the most interesting conclusions.
2. Fit the log-linear model without interactions.
3. Evaluate possible first order interactions and include them in the model (if there were any).
4. Perform an automatic variables selection basen on the AIC & BIC. Make a comparison of the models and argue which one is chosen.
5. Validate the model by checking the assumptions.
6. Make the diagnose for overdispersion.
7. Interpret the final model.