AML 610 Homework #4

**For all questions, please submit your R code, and a doc file with a copy of the screen output and plots (where applicable) to** [**smtowers@asu.edu**](mailto:smtowers@asu.edu)**.**

**Due Thus Oct 10th at noon.**

**The code in your R files should exhibit all of the good coding practices mentioned in** [**http://sherrytowers.com/2012/12/14/good-programming-practices-in-any-language/**](http://sherrytowers.com/2012/12/14/good-programming-practices-in-any-language/)

**Please do not just copy and paste code from the examples given in class into your code. Plots should exhibit all of the good plotting practices mentioned in** [**http://sherrytowers.com/2013/01/04/good-practices-in-producing-plots/**](http://sherrytowers.com/2013/01/04/good-practices-in-producing-plots/)

**Please submit your files in a format hwk4\_<first name>\_<initial of last name>.R and hwk4\_<first name>\_<initial of last name>.doc**

1) Read the paper by Rotton and Frey on the relationship between crime and temperature and air pollution at [www.sherrytowers.com/crime\_temperature\_and\_ozone.pdf](http://www.sherrytowers.com/crime_temperature_and_ozone.pdf)

Write a paragraph or two summarizing the study and the results.

2) Read the paper by Cohn and Rotton on the relationship between crime and holidays at [www.sherrytowers.com/crime\_and\_holidays.pdf](http://www.sherrytowers.com/crime_and_holidays.pdf)

Write a paragraph or two summarizing the study and the results.

2) Read in the Chicago crime data set for crimes of a non-domestic nature from [http://www.sherrytowers.com/chicago\_crime\_summary\_not\_domestic\_c.txt](http://www.sherrytowers.com/chicago_crime_summary_b.txt)

(in which I’ve also meshed in the climate and pollution data for you).

Create a new variable in this data set called father and set it to 1 on the Fathers day of each year, and 0 otherwise (this will require you to look up the dates of the Fathers days between 2001 and 2012).

Perform a regression analysis, regressing the number of non-domestic violent crimes plus batteries (x1+x2+x3+x4+x8) on the temperature, ozone, quadratic trend in time, weekday as a factor, and Fathers day as a factor. Use the stepAIC() function in the MASS library to find the most parsimonious model from these variables.

Are violent non-domestic crimes significantly higher on Fathers day?

Below is a plot I made from the detailed Chicago crime data set that shows the residuals of the above model vs hour of day (from midnight to midnight) for Fathers day, and the Sunday the week before and the week after for comparison. The plot in the second column shows the Z statistic that shows how much the crime rates on each hour of the day on Fathers day deviate from the crime on the same hour of the day averaged for the Sundays the week before and the week after.

If crimes are indeed significantly incited or suppressed by social interactions on Fathers day, what kind of temporal pattern over a 24 hour period would likely be expected? Comment on what the plot implies: does the temporal pattern in plot below, and the results of your regression fit, support the hypothesis that violent non-domestic crimes are either suppressed or incited by social interactions on Fathers day?

3) Do the same as in 2) but this time for Mothers day. Comment on whether the temporal patterns in the plot below support the hypothesis (in conjunction with the results of your regression fit) that social interactions on Mothers day incite or suppress non-domestic violent crime.



4) and 5) repeat questions 2) and 3), but this time with violent crime and batteries that are domestic. The data are in [www.sherrytowers.com/chicago\_crime\_summary\_domestic\_c.txt](http://www.sherrytowers.com/chicago_crime_summary_domestic_c.txt)

The plot below shows the temporal pattern of domestic violent crime on Fathers and Mothers day.

