**DSO 522: Time Series Regresssion Cases**

***Instructions:*** *Please complete the below cases in …. minutes, referencing the companion worksheets. Answer each question in text and, as applicable, using spreadsheets,* ***showing as much work as possible****. If you have a question about anything, please just make a reasonable assumption, making sure to clearly state all such assumptions.*

**Case 1**

**Background:** Sales (in units) of RedShoe.com’s products follow a peculiar, but predictable, pattern that determines how many units will sell in any given year.



**Data:** unit sales data are given in **Case1Data.xlsx**

**Task:**

1. Create a graph of sales of different color shoes on one graph and briefly comment on the behavior of sales.
2. Based on the sales history below, which color will sell the most units in 2002? Brown
3. Which will sell the most in the combined 2002-2004 time period?

***Remark: during the interview for a data scientist position the company suggested 10-15 minutes to work on this problem.***

**Case 2**

**Background:** An interesting experiment took place beginning in April 1979 in Albuquerque, New Mexico. The local police department tried a procedure they thought might have the effect of reducing driving-while-intoxicated (DWI) related accidents. The procedure was quite simple. A squad of police officers used a special van that housed a blood alcohol testing (BAT) device; the van became known as the “Batmobile”.

**Data:** In the quarterly data set (**Case2Data.xls**) is the information on the following variables:

**ACC** = injuries and fatalities from Wednesday through Saturday nighttime accidents

**FUEL** = Fuel consumption (millions of gallons) in Albuquerque

The first 29 observations in the data set are a control period before the implementation of the Batmobile program. The following 23 quarterly observations are the experimental period.

**Task:** Your job is to explain statistically using forecasting procedures whether the Batmobile program was effective.

**Case 3**

**Background:** The U.S. recession that began in December 2007 ended in June 2009, making the 18-month slump the longest since the Great Depression, according to the National Bureau of Economic Research. The slumping economy almost wiped out the domestic auto industry. In late 2008, the combination of an historic recession and financial crisis pushed the American auto industry to the brink of collapse. Access to credit for car loans dried up and auto sales plunged 40 percent. Auto manufacturers and suppliers dramatically curtailed production. Amidst an historic recession and financial crisis, the liquidation of major American auto companies threatened to eliminate more than one million jobs. Also at risk were the thousands of auto dealers across the country, as well as small businesses in communities with concentrations of auto workers.

**Data**: Quarterly Car Sales (in thousands of cars), Quarterly Light Truck Sales (in thousands of light trucks), Quarter, and Time. **Case3Data.xls**

**Task**: How badly did the recession hit this industry? Use a regression model to quantify the magnitude of losses from the recession on car sales. What would we have expected had the recession not happened, and car sales had instead followed the prior pattern? Build a forecasting model to explain the pattern and predict sales of the new cars in the US.

**Case 4**

**Background:** Retailer Best Buy sells computers, software, music, cameras, and other electronic goods.

**Data**: The data(**Case4Data.xslx**) for this case are quarterly gross profits of Best Buy, in millions of dollars from 1995 through 2011(Gross profits subtract the cost of goods that were sold from the total sales amount). The data table includes a column named Time that indicates the date of each quarter.

**Task**: Management has proposed making changes in the way the company is run. To measure the success of these changes, we need a point of reference. We would like to forecast profits in 2012 and use the forecast to measure the success of changes. Managers at Best Buy expect that there is a substantial increase in profits during the holiday season, but they would like to have a measure of the size of this effect. Can we confidently forecast whether sales will rise or fall?

**Case 5**

**Background:** ProLobsters is a direct-from-the-ocean shipper of fresh Maine lobsters to consumers throughout the United States. All orders are shipped FedEx Overnight or 2ndDay on the date requested by the customer. ProLobsters acquires new customers with daily spots on the Food Channel, and also enjoys a brisk repeat business. Three times each month, ProLobsters sends an e-mail to its entire customer base containing special offers.

**Data**: July sales data is detailed in **Case5Data.xlsx**, and the e-mail drop dates are highlighted in blue.

**Task**: Create a forecast for August daily orders, shipments, new customers, and retention orders.

***Remark: during the interview for a data scientist position the company suggested 40-60 minutes to work on this problem.***