**HW 1 – Business analytics.**

**Due Week 2 before class (See Blackboard). Late submissions receive 2pt per day deduction.**

To solve part b) below, you will need to do the following:

* 1. Use the Generalized Analytics Procedure (GAP) to set up your problem as follows:
     1. Define your model in words
        1. Identify the objective function in words
        2. Identify the random variables in words
        3. Identify the decision variables in words
     2. Formulate your model mathematically
        1. Define the decision variables
        2. Define the random variables
        3. Define the objective function in terms of decision variables and random variables
  2. Solve the problem in Excel
  3. Answer the questions stated in the problem (in words).

Please submit only one file in PDF format with your write-up. Do not submit your Excel file. Your writeup must include the screenshots from your Excel Spreadsheets.

If you make any additional assumptions, state them clearly.

**Australian Tobacco Production**

Tab “training data” of HW1 spreadsheet.xlsx spreadsheet contains 1990-2001 quarterly Australian Tobacco Production (in metric tons). Use the following three forecasting methods (see Lecture 1 slides for details) to forecast the production in the 10 quarters starting with Q1 2002, using the 1990-2001 data as your training data:

* + Simple Average
  + Naïve Seasonal
  + Drift

1. Create a line graph in Excel showing the predictions from the three forecasts. In addition to the forecasts, include the actual data (from 1990 to 2004) in your graph. Intuitively, based on the graph, which method do you think will perform best/worst? Include a screenshot of the graph with your submission. Do not attach the Excel file.
2. Complete part a) using R instead of Excel. Include screenshots of your R code, and the graph produced by R. Do not attach the file with the R code.
3. You have been tasked to select the best of the three methods to forecast the production in the next 10 quarters (Q1 2002 – Q2 2004). Which method do you prefer? Answer this question comparing the forecasts from each method against the actual (realized) production quantities found in Q1 2002 – Q2 2004 displayed in tab “full data”. Follow the procedure on the previous page (in red), and use an evaluation method of your choice (MAD or MSE).

You can either use Excel or R to answer part c). Include screenshot of the excel or R output to justify your answer.

1. (Bonus – not graded)

Come up with a forecasting method that outperforms the methods used in a)/b).