

ISyE 3103 Supply Chain Modeling: Transportation and Logistics Spring 2006

Extra Time Series Extrapolation Forecasting Problems

These are extra problems¹ provided for those of you who would like some additional practice in the mechanics of specifying time series extrapolation models. They will not count for any credit in your homework grade, but completing them would undoubtedly be good preparation for the forecasting quiz and the exams.

Question 1 The following gives the number of pints of type A blood used at Woodlawn hospital in the past six weeks.

WeekOf	PintsUsed
August 31	360
September 7	389
September 14	410
September 21	381
September 28	368
October 5	374

1. Forecast the demand for the week of October 12 using a 3-week moving average.
2. Use a 3-week *weighted* moving average with weights of 0.1, 0.3, and 0.6. Use 0.6 for the most recent demand observation. Forecast the demand for the week of October 12.
3. Compute the forecast for the week of October 12 using exponential smoothing with a forecast for August 31 of 360 and $\alpha = 0.2$.

Question 2 Income at the law firm of Smith and Wesson² for the period from February to July was as follows:

Month	Income(in000s)
February	70.0
March	68.5
April	64.8
May	71.7
June	71.3
July	72.8

1. Use Holt's Method (Double Exponential Smoothing) to forecast the law firm's August income. Assume that the initial parameter estimates are $\hat{a}_0 = 65$ and $\hat{b}_0 = 0$, and use smoothing parameters $\alpha = 0.1$ and $\beta = 0.2$.
2. Repeat the above using smoothing parameters $\alpha = 0.2$ and $\beta = 0.1$.

¹All of these problems are from Chapter 4 of the 6th edition of *Principles of Operations Management* by Heizer and Render published in 2006.

²How corny is that!

3. Compute MSE, RMSE, MAD, and MAPE for each of the two forecasting models above. Which method would you recommend using?

Question 3 Pasta Alfredo, a Des Moines restaurant, bases its manpower scheduling on the anticipated customer demand. Customer demand shows a little trend but substantial variability among the days of the week. Alfredo has collected the following data on the number of customers over the past 4 weeks.

	Week1	Week2	Week3	Week4
Monday	84	82	93	90
Tuesday	82	71	77	77
Wednesday	78	89	83	108
Thursday	95	94	103	106
Friday	130	144	135	135
Saturday	144	135	140	146
Sunday	42	48	37	50

Develop a forecasting model using Winters' Method (Triple Exponential Smoothing) with smoothing parameters $\alpha = 0.3$, $\beta = 0.2$, and $\gamma = 0.1$. Initialize your model based on the first 2 weeks of data. Compute MSE, RMSE, MAD, and MAPE for the four weeks of demand that you have. Use your model to forecast the number of customers who are expected to arrive each day in week 5.