OPRE 6398.003 Prescriptive Analytics
Homework 7

Due 03/22/17
(11:30 a.m.)

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Note: 1. Your homework submission must be typewritten.

2. Show only the solutions and do not copy the problems in the submission.

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1. Read Reading 9.

2. The short article "The Delphi Method" in the "Miscellaneous Information" folder on the course website provides a detailed account of the Delphi method, which is one of the qualitative forecasting methods. Read it and answer the following questions:

   (1) In what year did the technology forecasting studies eventually leading to the development of the Delphi method start?

   (2) At which organization were the basic notion, theoretical assumptions, and methodological procedures of the Delphi method developed in the 1950s and 1960s?

   (3) What are the three key elements of the original Delphi process?

   (4) What are the three general complaints about the Delphi method?

3. Club Warehouse (commonly referred to as CW) sells various computer products at bargain prices by taking telephone, Internet, and fax orders directly from customers. Reliable information on the aggregate quarterly demand for the past five quarters is available and has been summarized below:

Year	Quarter	Demand (units)
2015	4	1,356,800
2016	1	1,545,200
	2	1,198,400
	3	1,168,500
	4	1,390,000

   Let the fourth quarter of 2015 be Period 1, the first quarter of 2016 be Period 2, and so on. Apply each of the following methods to predict the demand for CW's products in the first quarter of 2017. Be sure to carry four decimal places for irrational numbers.

   (1) Naïve.

   (2) Three-quarter simple moving average.

   (3) Five-quarter weighted moving average with weights of 0.05, 0.15, 0.4, 0.3, and 0.1.

   (4) Simple exponential smoothing with a smoothing constant of 0.8 and a forecasted demand of 1,146,400 units for the second quarter of 2016.

4. The partial productivity of labor (output per hour of all persons) for the U.S. manufacturing industry in each of the nine years from 2005 to 2013 has been summarized below (Year 2009 = 100.0):

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013
Productivity	93.8	97.1	102.9	107.0	100.0	110.2	116.2	118.2	118.2

(1) Use a computer software program (e.g., Excel) to plot the historical data from 2005 to 2013 and show the graph. Based on the graph plotted, which of the forecasting methods discussed in class would be most appropriate for this problem and why?

(2) Apply the method selected in (1) to provide a forecast of the partial productivity of labor for the years of 2014. Be sure to carry four decimal places for any irrational numbers.

(3) What was the partial productivity of labor for the U.S. manufacturing industry in 2014 according to the data published by the Bureau of Labor Statistics at http://www.bls.gov/news.release/prod5.t02.htm?

(4) Is your forecast in (2) very close to or quite different from the actual productivity found in (3)? By how much do they differ?

(5) Use the Excel functions "=Slope(Array Y, Array X)" and "=Intercept(Array Y, Array X)" to find the slope and the intercept, respectively, of the best-fit rend line sought in (2). Be sure to carry four decimal places for any irrational numbers.

(6) Are the results obtained in (5) consistent with those found in (2) in general?