Benha University
Shoubra Faculty of Engineering
Industrial Eng. Department
Credit Hours System

INDUSTRIAL ENGINEERING DEPARTMENT

Production Planning & Control
Code: IND 201

Forecasting problems

1- Given the following data: prepare a forecast using each of these approaches:
   a- The naïve approach
   b- A 3-period moving average
   c- A weighted average using weights of 0.5, 0.3 and 0.2.
   d- Exponential smoothing with a smoothing constant of 0.4.

Period	1	2	3	4	5
Number of complaints	60	65	55	58	64

2- The number of bushels of apples sold at a roadside fruit stand over 12 day period were as follows:

Day	1	2	3	4	5	6	7	8	9	10	11	12
Number sold	25	31	29	33	34	37	35	32	38	40	37	32

   a. If a two moving average has been used to forecast sales, what were the daily forecasts starting with the forecast for day 3.
   b. If a four period moving average has been used, what were the forecasts for each day starting with day 5.
   c. Plot the original data and each set of forecasts on the same graph. Which forecast has the greater tendency to smooth? Which forecast has the better ability to respond quickly to changes?

3- If the exponential smoothing with $\alpha = 0.4$ has been used to forecast daily sales for apples in problem 2, determine what the daily forecasts would have been. Then plot the original data, the exponential forecasts, and a set of naïve forecasts on the same graph. Based on the visual comparison, is the naïve more accurate or less accurate than the exponential smoothing method, or are they about the same?

4- Apple's Citrus fruit farm ships boxed fruit anywhere in the continental United States. Using the following information forecast shipments for the first four mouths. The monthly forecast equation being used is: y= 402+3t where: t0 January of last year and y is the number of shipments. Determine the amounts of shipments for the first four months of the next year: January t=24; February t=25 etc.

Month	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Seasonal relative	1.2	1.3	1.3	1.1	0.8	0.7	0.8	0.6	0.7	1.0	1.1	1.4

5- Develop a linear trend line for the following data. Plot the line and the data on a graph, and verify visually that a linear trend line is appropriate. Then use the equation to predict the next two values of the series.

Period	1	2	3	4	5	6	7	8	9
Demand	44	52	50	54	55	55	60	56	62

6- The owner of a small hardware store has noted a sales pattern for window locks that seems to parallel the number of break-ins reported each week in the newspaper. The data

are:

sales	46	18	20	22	27	34	14	37	30
Break-ins	9	3	3	5	4	7	2	6	4

a. Plot the data to determine which type of equation is appropriate
b. Obtain a regression equation for the data
c. Estimate sales when the number of break-ins is five

7- National mixer, Inc., sells can openers. Monthly sales for a seven-month period were as follows:

Month	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.
Sales (1000 units)	19	18	15	20	18	22	20

a- Plot the monthly data on a sheet of graph paper
b- Forecast September sales volume using each of the following:
1. A linear regression
2. A five-month moving average
3. Exponential smoothing with a smoothing constant equal to 0.2, assuming a March forecast of 19000 units
4. The naive approach
5. Aweighted average using 0.6, 0.3, and 0.1 wieghts

c- Which method seems least appropariate? Why?

8- Mark Cotteleer owns a company that manufactures sailboats. Actual demand for Mark's sailboats during each season in 2006 through 2009 was as follows:

	Year			
Season	2006	2007	2008	2009
Winter	1400	1200	1000	900
Spring	1500	1400	1600	1500
Summer	1000	2100	2000	1900
Fall	600	750	650	500

Mark has forecasted that the annual demand for his sailboats in 2011 will equal 5600 sailboats. Based on this data determine the forecasted value for the spring 2011.

9- The manager of a large manufacturer of industerial pumps must choose between two alternative forecasting techniques. Both techniques have been used to prepare forecasts for a six-months period. Compute the MAD and MSE. Relying on MAD which technique has the beter performance.

	Month	1	2	3	4	5	6
	Demand	492	470	485	493	498	492
Forecast	Tech-1	488	484	480	490	497	493
	Tech-2	495	482	478	488	492	493

10- Collect real data for a small case study, conduct the forecasted approaches then propose the most suitable one to be used to estimate the values of two future periods.