MAT540

Week 4 Homework

<u>Chapter 15</u>

1. The manager of the Carpet City outlet needs to make an accurate forecast of the demand for Soft Shag carpet (its biggest seller). If the manager does not order enough carpet from the carpet mill, customer will buy their carpet from one of Carpet City's many competitors. The manager has collected the following demand data for the past 8 months:

Month	Demand for Soft Shag Carpet (1,000 yd.)
1	10
2	9
3	8
4	9
5	10
6	12
7	14
8	11

   a. Compute a 3-month moving average forecast for months 4 through 9.
   b. Compute a weighted 3-month moving average forecast for months 4 through 9. Assign weights of 0.55, 0.35, and 0.10 to the months in sequence, starting with the most recent month.
   c. Compare the two forecasts by using MAD. Which forecast appears to be more accurate?

2. The manager of the Petroco Service Station wants to forecast the demand for unleaded gasoline next month so that the proper number of gallons can be ordered from the distributor. The owner has accumulated the following data on demand for unleaded gasoline from sales during the past 10 months:

Month	Gasoline Demanded (gal.)
October	775
November	835
December	605
January	450
February	600
March	700
April	820
May	925
June	1500
July	1200

    a. Compute an exponential smoothed forecast, using an α value of 0.4

    b. Compute the MAD.

3. Emily Andrews has invested in a science and technology mutual fund. Now she is considering liquidating and investing in another fund. She would like to forecast the price of the science and technology fund for the next month before making a decision. She has collected the following data on the average price of the fund during the past 20 months:

Month	Fund Price
1	$55 ¾
2	54 ¼
3	55 1/8
4	58 1/8
5	53 3/8
6	51 1/8
7	56 ¼
8	59 5/8
9	62 ¼
10	59 ¼
11	62 3/8
12	57 1/1

13	58 1/8
14	62 ¾
15	64 ¾
16	66 1/8
17	68 ¾
18	60.5
19	65.875
20	72.25

    a. Using a 3-month average, forecast the fund price for month 21.

    b. Using a 3-month weighted average with the most recent month weighted 0.5, the next most recent month weighted 0.30, and the third month weighted 0.20, forecast the fund price for month 21.

    c. Compute an exponentially smoothed forecast, using $\alpha=0.3$, and forecast the fund price for month 21.

    d. Compare the forecasts in (a), (b), and (c), using MAD, and indicate the most accurate.

4. Carpet City wants to develop a means to forecast its carpet sales. The store manager believes that the store's sales are directly related to the number of new housing starts in town. The manager has gathered data from county records on monthly house construction permits and from store records on monthly sales. These data are as follows:

Monthly Carpet Sales (1,000 yd.)	Monthly Construction Permits
9	17
14	25
10	8
12	7
15	14
9	7
24	45
21	19
20	28

29	28

a. Develop a linear regression model for these data and forecast carpet sales if 30 construction permits for new homes are filed.

b. Determine the strength of the causal relationship between monthly sales and new home construction by using correlation.

5. The manager of Gilley's Ice Cream Parlor needs an accurate forecast of the demand for ice cream. The store orders ice cream from a distributor a week ahead; if the store orders too little, it loses business, and if it orders too much, the extra must be thrown away. The manager belives that a major determinant of ice cream sales is temperature (i.e.,the hotter the weather, the more ice cream people buy). Using an almanac, the manager has determined the average day time temperature for 14 weeks, selected at random, and from store records he has determined the ice cream consumption for the same 14 weeks. These data are summarized as follows:

Week	Average Temperature (Degrees)	Ice Cream Sold (gal.)
1	68	80
2	70	115
3	73	91
4	79	87
5	77	110
6	82	128
7	85	164
8	90	178
9	85	144
10	92	179
11	90	144
12	95	197
13	80	144
14	75	123

a. Develop a linear regression model for these data and forecast the ice cream consumption if the average weekly daytime temperature is expected to be 85 degrees.

b. Determine the strength of the linear relationship between temperature and ice cream consumption by using correlation.

c. What is the coefficient of determination? Explain its meaning.