**Tutorial set #1**

**Question 1:**

1. Define a time series? mention some examples of time series data.
2. Mention four goals of time series analysis.
3. Explain briefly the components of a time series.
4. Explain the difference between time series models and causal models.
5. When measuring forecast accuracy (or error size), explain why don’t we use the sum of errors.
6. Is the best forecasting technique always the most accurate one? explain.
7. Give two examples from the real life of a time series that have:
8. seasonal component of length a year.
9. seasonal component of length a month.
10. seasonal component of length a week.
11. seasonal component of length a day.

**Question 2:**

The following table monthly sales (in thousands of riyals) of some item, and estimated values of the sales calculated from some fitted model:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Year | 1995 | 1996 | 1997 | 1998 | 1999 |
| Sales | 240 | 251 | 265 | 250 | 260 |
| Estimated sales | 235 | 258 | 260 | 260 | 255 |

1. calculate the estimated errors.
2. calculate mean squared errors MSE, the mean absolute deviances MAD, and mean absolute percentage errors MAPE.

**Question 3:**

The following table shows the loans financed by a bank (in millions of dollars) in the period 1995 to 2001:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Year | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
| Sales | 12 | 13 | 11 | 13 | 12 | 14 | 11 |

1. Use the method of simple moving averages method to find all the possible forecasts using k=3, and k=4. Also find the mean absolute deviances in each case.
2. Forecast the amount of loans that the bank will finance in the year 2002 using the simple moving average method.
3. Estimate the initial value $\hat{y}\_{0}(1)$ using the mean of the series, then use the single exponential smoothing method to find all the forecasts, use $α=0.75$, and then $α=0.95$. Which one gives a better forecasts? explain.