

IENG/MANE 332 Tutorial Material

- 1- The HnG store sells suntan cream in a small touristic island. The owner of the store is interested in about how many cases of suntan cream he should order for the next week. He uses the number of the tourists arrive the island in a week to determine the size of his suntan cream order for the next week. He recorded the following data for some past weeks.

Week (t)	Number of the tourists arrived the island in the previous week	Demand of suntan cream (in cases)
1	610	52
2	845	72
3	606	51
4	514	61
5	440	40
6	748	80
7	865	68
8	821	67
9	689	55
10	758	71

- He learned that in the current week 1250 tourists arrived the island. Use the linear regression model and determine the expected demand of suntan cream (in cases) from his store for the next week (round it up).
- Plot residuals and calculate mean value of errors
- Check normality of residuals by normal probability plot

- 2- A company has the following demand records for the past 12 months.

Month	t	Demand (dt)
June 2016	1	263
July 2016	2	270
August 2016	3	255
September 2016	4	260
October 2016	5	260
November 2016	6	270
December 2016	7	277
January 2017	8	288
February 2017	9	300
March 2017	10	307
April 2017	11	310
May 2017	12	325

Assume that the company forecasted the demand of December 2016 at November 2016 first time and then it has been forecasting the demand by the double exponential smoothing method ($\alpha=0.2$, $\beta=0.6$).

- Forecast the demand of the next month, June 2017.
- Repeat forecasting of periods with ($\alpha=0.2$, $\beta=0.4$). use MAD, MSE, and MAPE variation methods and according to that values, which combination of α , β is better than other.

3- A company has the following demand records for the past 12 months

Month	t	Demand d_t
June 2016	1	253
July 2016	2	262
August 2016	3	245
September 2016	4	240
October 2016	5	256
November 2016	6	246
December 2016	7	252
January 2017	8	259
February 2017	9	263
March 2017	10	250
April 2017	11	240
May 2017	12	248

- a) Plot the past data. Considering the demand in the time which type of demand process does the company have?
- b) Assume that the company forecasted the demand of November 2016 at October 2016 first time and then it has been forecasting the demand by the LDP (Last Data Point) method.
 - b.1. compute the forecasts of the company.
 - b.2. compute MAD, MAPE, and MSE variation values using the forecasts and demands from November 2016 to May 2017.
 - b.3. forecast the demand of the next month, June 2017
- c) Assume that the company forecasted the demand of November 2016 at October 2016 first time and then it has been forecasting the demand by the Moving Average Method (N=5)
 - c.1. compute the forecasts of the company
 - c.2. compute MAD, MAPE, and MSE variation values using the forecasts and demands from November 2016 to May 2017.
 - c.3. forecast the demand of the next month, June 2017
- d) Assume that the company forecasted the demand of November 2016 at October 2016 first time and then it has been forecasting the demand by the Exponential Moving Average ($\alpha = 0.2$ and $F_6 = 250$)
 - d.1. compute the forecasts of the company
 - d.2. compute MAD, MAPE, and MSE variation values using the forecasts and demands from November 2016 to May 2017.
 - d.3. forecast the demand of the next month, June 2017

4- A company has the following demand records for the past 12 months

Month	t	Demand d_t
June 2016	1	253
July 2016	2	262
August 2016	3	265
September 2016	4	260
October 2016	5	272
November 2016	6	281
December 2016	7	282
January 2017	8	294
February 2017	9	293
March 2017	10	307
April 2017	11	314
May 2017	12	312

- a) Plot the past data. Considering the demand in the time which type of demand process does the company have?
- b) Assume that the company forecasted the demand of December 2016 at November 2016 first time and then it has been forecasting the demand by the Double Exponential Smoothing Method ($\alpha = 0.3, \beta = 0.4$).
 - b.1. compute the forecasts of the company.
 - b.2. compute MAD, MAPE, and MSE variation values using the forecasts and demands from December 2016 to May 2017.
 - b.3. forecast the demand of the next month, June 2017
- c) Assume that the company forecasted the demand of December 2016 at November 2016 first time and then it has been forecasting the demand by the Double Exponential Smoothing Method ($\alpha = 0.5, \beta = 0.2$).
 - b.1. compute the forecasts of the company.
 - b.2. compute MAD, MAPE, and MSE variation values using the forecasts and demands from December 2016 to May 2017.
 - b.3. forecast the demand of the next month, June 2017
 - b.4. which combination of α , and β , gives better estimation?

5- The demand of a product of a company is given below for the past periods. Forecast the demand for the following 4 periods by the Winter's method.

T	1	2	3	4	5	6	7	8
Demand	20	30	35	28	26	37	43	34