EXERCISES

1. Consider monthly demand for the ABC Corporation, as shown in Table 7.4. Forecast the monthly demand for Year 6 using the static method for forecasting. Evaluate the bias, TS, MAD, MAPE, and MSE. Evaluate the quality of the forecast.

TABLE 7-4 Monthly Demand for ABC Corporation

Sales	Year 1	Year 2	Year 3	Year 4	Year 5
January	2,000	3,000	2,000	5,000	5,000
February	3,000	4,000	5,000	4,000	2,000
March	3,000	3,000	5,000	4,000	3,000
April	3,000	5,000	3,000	2,000	2,000
May	4,000	5,000	4,000	5,000	7,000
June	6,000	8,000	6,000	7,000	6,000
July	7,000	3,000	7,000	10,000	8,000
August	6,000	8,000	10,000	14,000	10,000
September	10,000	12,000	15,000	16,000	20,000
October	12,000	12,000	15,000	16,000	20,000
November	14,000	16,000	18,000	20,000	22,000
December	8,000	10,000	8,000	12,000	8,000
Total	78,000	89,000	98,000	115,000	113,000

2. Weekly demand figures at Hot Pizza are as shown. Estimate demand for the next 4 weeks using a 4-week moving average as well as simple exponential smoothing with $\alpha = 0.1$. Evaluate the MAD, MAPE, MSE, bias, and TS in each case. Which of the two methods do you prefer? Why?

Week	Demand ($)
1	108
2	116
3	118
4	124
5	96
6	119
7	96
8	102
9	112
10	102
11	92
12	91

3. Quarterly demand for flowers at a wholesaler are as shown. Forecast quarterly demand for year 5 using simple exponential smoothing with $\alpha = 0.1$ as well as Holt's model with $\alpha = 0.1$ and $\beta = 0.1$. Which of the two methods do you prefer? Why?

Year	Quarter	Demand ($000)
1	I	98
	II	106
	III	109
	IV	133
2	I	130
	II	116
	III	133
	IV	116
3	I	138
	II	130
	III	147
	IV	141
4	I	144
	II	142
	III	165
	IV	173

4. Consider monthly demand for the ABC Corporation as shown in Table 7-3. Forecast the monthly demand for Year 6 using moving average, simple exponential smoothing, Holt's model, and Winter's model. In each case, evaluate the bias, TS, MAD, MAPE, and MSE. Which forecasting method do you prefer? Why?
5. For the Hot Pizza data in Exercise 2, compare the performance of simple exponential smoothing with $\alpha = 0.1$ and $\alpha = 0.9$. What difference in forecasts do you observe? Which of the two smoothing constants do you prefer?
6. Monthly demand at A&D Electronics for flat-screen TVs are as shown. Estimate demand for the next two months using simple exponential smoothing with $\alpha = 0.3$ and Holt's model with $\alpha = 0.05$ and $\beta = 0.1$. For the simple exponential smoothing model, use the level at Period 0 to be $L_0 = 1{,}659$ (the average demand over the 12 months). For Holt's model, use level at Period 0 to be $L_0 = 948$ and the trend in Period 0 to be $T_0 = 109$ (both are obtained through regression). Evaluate the MAD, MAPE, MSE, bias, and TS in each case. Which of the two methods do you prefer? Why?

Month	Demand (units)
1	1,000
2	1,113
3	1,271
4	1,445
5	1,558
6	1,648
7	1,724
8	1,850
9	1,864
10	2,076
11	2,167
12	2,191

7. Using the A&D Electronics data in Exercise 6, repeat Holt's model with $\alpha = 0.5$ and $\beta = 0.5$. Compare the performance of Holt's model with $\alpha = 0.05$ and $\beta = 0.1$. Which combination of smoothing constants do you prefer? Why?
8. Weekly demand for dry pasta at a supermarket chain is as shown. Estimate demand for the next four weeks 11 to 14 using a five-week moving average, as well as simple exponential smoothing with $\alpha = 0.2$. Evaluate the MAD, MAPE, MSE, bias, and TS in each case. Which of the two methods do you prefer? Why?

Week	Demand (units)
1	517
2	510
3	557
4	498
5	498
6	444
7	526
8	441
9	541
10	445

9. Quarterly demand for smartphones at a retailer is as shown. After obtaining initial estimates for level, trend, and seasonal factors, forecast quarterly demand for year 5 using Winter's model with $\alpha = 0.05$, $\beta = 0.10$, and $\gamma = 0.15$. Evaluate the MAD, MAPE, MSE, bias, and TS for the forecast. Can you find values of α, β, γ that result in a lower MAD or MSE?

Year	Quarter	Demand
1	I	513
	II	932
	III	1,509
	IV	1,902
2	I	693
	II	1,163
	III	1,857
	IV	2,469
3	I	846
	II	1,439
	III	2,271
	IV	3,079
4	I	1,070
	II	1,751
	III	2,785
	IV	3,613

10. Quarterly demand for dishwashers at a white goods retailer is as shown. After obtaining initial estimates for level, trend, and seasonal factors, forecast quarterly demand for year 5 using Winter's model with $\alpha = 0.10$, $\beta = 0.10$, and $\gamma = 0.10$. Evaluate the MAD, MAPE, MSE, bias, and TS for the forecast. Can you find values of α, β, γ that result in a lower MAD or MSE?

Year	Quarter	Demand
1	I	1,934
	II	1,276
	III	3,991
	IV	5,632

Year	Quarter	Demand
2	I	4,862
	II	1,698
	III	7,104
	IV	9,939
3	I	6,129
	II	3,318
	III	9,260
	IV	12,418
4	I	7,960
	II	5,459
	III	10,990
	IV	13,483