Beginning on Page 43 Problem 2.6 A production line is to run at 1000 units per month. Sales are forecast as shown. Calculate the period ending inventory. Opening inventory is 500. All periods have the same number of working days.

Week		1	2	3	4	5	6
Forecast		700	700	1100	1600	1100	800
Planned Production		1000	1000	1000	1000	1000	1000
Planned Inventory	500						

Problem 2.7 A company wants to develop a level production plan for a family of products. The opening inventory is 100 units and an increase to 160 units is expected by the end of the plan. Demand is as follows. How much should be produced each period and what is the ending inventories for each period?

Week		1	2	3	4	5	6	Total
Forecast		100	120	130	140	120	110	
Planned Production								
Planned Inventory	100							

Problem 2.8 A company wants to develop a level production plan for a family of products. The opening inventory is 500 units and a decrease to 300 units is expected by the end of the plan. Demand is as follows. How much should be produced each period and what is the ending inventory for each period? Do you see a problem with the plan?

Week		1	2	3	4	5	6	Total
Forecast		1200	1200	800	600	800	1000	
Planned Production								
Planned Inventory	500							

Problem 2.9 A company wants to develop a level production plan. The opening inventory is zero (0) units. (a) What production rate will give a zero inventory at the end of period 4? (b) When and in what quantities will back orders occur? (c) What level of production rate per period will avoid back orders? (d) What is the ending inventory for period 4?

Week		1	2	3	4	Total
Forecast		9	5	9	9	
Planned Production						
Planned Inventory	0					

Problem 2.11 A company wants to develop a level production plan for a family of products. The opening inventory is 100 units and an increase to 130 is expected by the end of the

plan. Calculate the total production, daily production, and production and ending inventory for each month.

Month		May	Jun	Jul	Aug	Total
Working Days		21	19	20	10	
Forecast		115	125	140	150	
Planned Production						
Planned Inventory	100					

Problem 2.12 A company wants to develop a level production plan for a family of products. The opening inventory is 600 units and a decrease to 200 units is expected by the end of the plan. How much should the company produce each month? What will be the ending inventory in each month? Do you see any problems?

Month		Jan	Feb	Mar	Apr	May	Jun	Total
Working Days		20	22	20	20	18	19	
Forecast		1200	1300	800	700	700	900	
Planned Production								
Planned Inventory	600							

Problem 2.13 Because of its labor contract a company must hire enough labor for 100 units of production per week on one shift or 200 units per week on two shifts. They cannot hire, lay off, or work overtime. During the fourth week, workers will be available from another department to work part or all of an extra shift (up to 100 units) There is a planned shutdown for maintenance in the second week, which will cut production to half. Develop a production plan. The opening inventory is 200 units, and the desired ending inventory is 300 units.

Week		1	2	3	4	5	6	Total
Forecast Demand		120	160	240	240	160	160	
Planned Production								
Planned Inventory	200							

Problem 2.15 The opening backlog is 900 units. Forecast demand is shown, develop a level production plan if the backlog is to be reduced to 200 units.

Week		1	2	3	4	5	6	Total
Forecast Demand		600	700	700	700	600	500	
Planned Production								
Projected Backlog	900							

Problem 2.16 The opening backlog is 1100 units. Calculate the weekly production for level production if the backlog is to be increased to 1200 units.

Week	1	2	3	4	5	6	Total

Forecast Demand		1200	1100	1200	1200	1100	1000	
Planned Production								
Projected Backlog	1000							

Problem 2.17 Calculate the number of workers required for level production. Each worker can produce 14 units per day. The desired inventory is 9000 units.

Month		1	2	3	4	Total
Working Days		20	24	12	19	
Forecast		28000	27500	28500	28500	
Planned Production						
Planned Inventory	11500					

Problem 2.18 Calculate the number of workers required for level production. Each worker can produce 9 units per day. The desired inventory is 800 units. Why is it not possible to exactly reach the ending inventory?

Month		1	2	3	4	5	6	Total
Working Days		20	24	12	22	20	19	
Forecast		2800	3000	2700	3300	2900	3200	
Planned Production								
Planned Inventory	1000							

Beginning on Page 67 Problem 3.1 The Wicked Witch Whisk Company manufactures a line of broomsticks. The most popular is the 36-inch model, and the sales department has prepared a forecast for six weeks. The opening inventory is 30. As master scheduler, you must prepare an MPS. The brooms are manufactured in lots of 100.

Week		1	2	3	4	5	6
Forecast		10	50	25	50	10	15
Projected Available	30						
MPS							

Problem 3.2 The Shades Sunglass Company assembles sunglasses from frames, which it makes, and lenses, which it purchases from an outside supplier. The sales department has prepared the following six-week forecast for Ebony, a popular mode. The sunglasses are assembled in lots of 200, and the opening inventory is 300 pairs. Complete the projected available balance and the master production schedule.

Week		1	2	3	4	5	6
Forecast		200	300	350	200	150	150
Projected Available	300						
MPS							

Problem 3.3 Amalgamated Mailbox Company manufactures a family of two mailboxes. The production plan and the MPS are developed on a quarterly basis. The forecast for the product group follows. The opening inventory is 270 units, and the company wants to reduce this to 150 units at the end of the year. Develop a level production plan.

Production Plan

Week		1	2	3	4	Total
Forecast		220	300	200	200	
Projected Available	270					
MPS						

Problem 3.3 continued on the next page.

The forecast sales for each of the mailboxes in the family also follow. Develop an MPS for each item, bearing in mind that production is to be leveled as in the production plan. For each mailbox, the lot size is 200.

Mailbox A. Lot size: 200

Week		1	2	3	4	Total
Forecast		120	180	100	120	
Projected Available	120					
MPS						

Mailbox B. Lot size: 200

Week		1	2	3	4	Total
Forecast		100	120	100	80	
Projected Available	150					
MPS						

Problem 3.4 Worldwide Can-Openers, Inc. makes a family of two hand-operated can openers. The production plan is based on months. There are four weeks in this month. Opening inventory is 2000 dozen, and it is planned to increase that to 4000 dozen by the end of the month. The MPS is made using weekly periods. The forecast and projected available balance for the two models follow. The lot size for both models is 1000 dozen. Calculate the production plan and the MPS for each item.

Production Plan

Week		1	2	3	4	Total
Forecast		3000	3500	3500	4000	
Projected Available	2000					
MPS						

Mailbox A. Lot size: 1000

Week		1	2	3	4	Total
Forecast		2000	2000	2500	2000	
Projected Available	1500					
MPS						

Mailbox B. Lot size: 1000

Week		1	2	3	4	Total
Forecast		1000	1500	1000	2000	
Projected Available	500					
MPS						

Problem 3.6 The Acme Widget Company makes widgets in two models, and the bottle neck operation is in work center 10. Following is the resource bill (in hours per part).

Resource Bill

	Hours per Part	
Work Center	Model A	Model B
10	2.5	3.3

The Master Production Schedule for the next five weeks is:

Week	1	2	3	4	5
Model A	70	50	50	60	45
Model B	20	40	55	30	45

a) Using the resource bill and the master production schedule, calculate the number of hours required in work center 10 for each of the five weeks. Use the following table to ro record the required capacity on the work center.

Hours Required Based on Resource Bill

Week	1	2	3	4	5
Model A					
Model B					
Total Hours					

b) If the available capacity at work station 10 is 260 hours per week, suggest possible ways of meeting the demand in week 3.

Problem 3.7: Calculate the ATP using the following data. There are 100 units on hand

Week		1	2	3	4	5	6
Customer Orders		70	70	20	40	10	
MPS			100		100		100
ATP							

Problem 3.8 Given the following data, calculate the ATP.

Week		1	2	3	4	5	6
Customer Orders		21		14	9		3
MPS		30		30	30		
ATP							

Problem 3.9: Using the scheduled receipts, calculate the ATP. There are 0 units on hand.

Week	1	2	3	4	5	6	7	8	9	10
Customer Orders	10		10		60	18			10	

MPS		50				50				50	
ATP											

Problem 3.10: Using the scheduled receipts, calculate the ATP. There are 45 units on hand.

Week		1	2	3	4	5	6	7	8
Customer Orders		45	50	40	40	40	40	30	15
MPS			100		100		100		100
ATP									

Problem 3.11: Using the following data to calculate the ATP. There are 60 units on hand.

Week		1	2	3	4	5	6
Customer Orders		20	50	30	30	50	30
MPS			100			100	
ATP							

Problem 3.12: Given the data in problem 3.10, can an order for 20 for delivery in week 4 be accepted? Calculate the ATP using the following table.

Week		1	2	3	4	5	6	7	8
Customer Orders		50	50	30	60	50	40	30	15
MPS			100		100		100		100
ATP									

Problem 3.13: Given the following data, can an order for 30 more units for delivery in week 5 be accepted? If not, what do you suggest? Assume 50 units on hand.

Week		1	2	3	4	5	6	7	8
Customer Orders		70	10	50	40	10	15	20	50
MPS		100		100			100		
ATP									

Problem 3.14: Given the following data, calculate the projected available balance and the planned MPS receipts. The order quantity is 200. The time fence is two weeks.

Week		1	2	3	4	
Forecast		80	80	80	70	
Customer Orders		100	90	50	40	
Projected Available	140					
MPS						

Problem 3.15: Given the following data, calculate the projected available balance and the planned MPS receipts. The order quantity is 100. The time fence is two weeks.

Week		1	2	3	4	
Forecast		50	50	50	50	
Customer Orders		60	30	60	20	
Projected Available	60					
MPS						

Problem 3.16: Complete the following problem. The lead time is one week and the time fence is week 3. The order quantity is 60, and there are 20 on hand.

Week		1	2	3	4	5	6
Forecast		20	21	22	20	28	25
Customer Orders		19	18	20	18	30	22
Projected Available							
MPS							
ATP							

Beginning on Page 107 Problem 4.3 Using the product tree in the text to determine the planned order receipts and planned order releases if 200 "A"s are to be produced in week 5.

	WEEK	1	2	3	4	5	
Part A LT = 1 week	PLANNED ORDER RECEIPT PLANNED ORDER RELEASE						
Part B LT = 1 week	PLANNED ORDER RECEIPT PLANNED ORDER RELEASE						
Part C LT = 1 week	PLANNED ORDER RECEIPT PLANNED ORDER RELEASE						
Part D LT = 1 week	PLANNED ORDER RECEIPT PLANNED ORDER RELEASE						
Part E LT = 2 week	PLANNED ORDER RECEIPT PLANNED ORDER RELEASE						

Problem 4.4 Complete the following table. Lead time for the part is two weeks, and the order quantity is 40. What action should be taken?

Week		1	2	3	4	
Gross Requirements		10	15	10	20	
Projected Available	30					
Net Requirements						
Planned Order Receipt						
Planned Order Release						

Problem 4.5 Given the product tree drawn in the text, explode, offset, and determine the gross and net requirements. All lead times are one week, and the quantities required are shown in ()'s. The master production schedule calls for 100 As to available in week 5. There are 20 Bs available.

PART NUMBER		WEEK				
		1	2	3	4	5
Part A	Gross requirements Projected available Net requirements Planned order receipt Planned order release					
Part B	Gross requirements Projected available Net requirements Planned order receipt Planned order release					
Part C	Gross requirements Projected available Net requirements Planned order receipt Planned order release					
Part D	Gross requirements Projected available Net requirements Planned order receipt Planned order release					
Part E	Gross requirements Projected available Net requirements Planned order receipt Planned order release					
Part F	Gross requirements Projected available Net requirements Planned order receipt Planned order release					

Problem 4.6

Complete the following table. Lead time for the part is two weeks. The lot size is 100. What is the projected available at the end of week 3? When is it planned to release an order?

Week		1	2	3	4	
Gross Requirements		20	65	40	25	
Scheduled Receipts			100			
Projected Available	40					
Net Requirements						
Planned Order Receipt						
Planned Order Release						

Problem 4.7

Complete the following table. Lead time for the part is two weeks. The lot size is 50. What is the projected available at the end of week 3? When is it planned to release an order?

Week		1	2	3	4	
Gross Requirements		30	25	10	10	
Scheduled Receipts		50				
Projected Available	10					
Net Requirements						
Planned Order Receipt						
Planned Order Release						

Problem 4.8 Given the following partial product tree (in text), explode, offset, and determine the gross and net requirements for components H, I, J, and K. There are other components, but they are not connected to this problem. The quantities required are shown in ()'s. The master production schedule calls for production of 50 Hs in week 3 and 80 in week 5. There is a scheduled receipt of 100 Is in week 2. There are 400 Js and 400 Ks available.

PART NUMBER		WEEK				
		1	2	3	4	5
Part H LT = 1 week	Gross requirements Scheduled Receipts Projected available Net requirements Planned order receipt Planned order release					
Part I LT = 2 week	Gross requirements Scheduled Receipts Projected available Net requirements Planned order receipt Planned order release					
Part J LT = 1 week	Gross requirements Scheduled Receipts Projected available 400 Net requirements Planned order receipt Planned order release					
Part K LT = 1 week	Gross requirements Scheduled Receipts Projected available 400 Net requirements Planned order receipt Planned order release					

Problem 4.9 MPS parent X has planned order releases of 30 in weeks 2 and 4. Given the following product tree, complete the MRP records for parts Y and Z.

Part Y LT = 2 weeks Lot Size: 50	WEEK			
	1	2	3	4
Gross requirements Scheduled Receipts Projected available 30 Net requirements Planned order receipt Planned order release				

Part Z LT = 1 week Lot Size: 100	WEEK			
	1	2	3	4
Gross requirements Scheduled Receipts Projected available 20 Net requirements Planned order receipt Planned order release				

Problem 4.10 Given the product tree (in text), explode, offset, and determine the gross and net requirements. The master production schedule calls for production of 100 As in week 5. There is a scheduled receipt of 100 Bs in week 1. There are 200 Fs available. Order quantities are lot for lot.

	WEEK	1	2	3	4	5
Part A LT = 1 week	Gross requirements Scheduled Receipts Projected available Net requirements Planned order receipt Planned order release					
Part B LT = 1 week	Gross requirements Scheduled Receipts Projected available Net requirements Planned order receipt Planned order release					
Part C LT = 1 week	Gross requirements Scheduled Receipts Projected available Net requirements Planned order receipt Planned order release					
Part D LT = 1 week	Gross requirements Scheduled Receipts Projected available Net requirements Planned order receipt Planned order release					
Part E LT = 1 week	Gross requirements Scheduled Receipts Projected available Net requirements Planned order receipt Planned order release					
Part F LT = 1 week	Gross requirements Scheduled Receipts Projected available Net requirements Planned order receipt Planned order release					

Problem 4.11 Using the product tree in the text, complete the MRP records for parts X, Y, an Z. Note the specified order quantities for parts X and Y.

	WEEK	1	2	3	4	5
Part X LT = 1 week Lot Size: 20	Gross requirements Scheduled Receipts Projected available 10 Net requirements Planned order receipt Planned order release	15 20	5	15	10	15
Part Y LT = 2 weeks Lot Size: 50	Gross requirements Scheduled Receipts Projected available 30 Net requirements Planned order receipt Planned order release		50			
Part Z LT = 2 weeks Lot Size: LFL	Gross requirements Scheduled Receipts Projected available Net requirements Planned order receipt Planned order release		90			
Part W LT = 1 week Lot Size: 400	Gross requirements Scheduled Receipts Projected available Net requirements Planned order receipt Planned order release					

Problem 4.14 Use the product tree in the text to develop the MRP for these components.

Code		WEEK	1	2	3	4	5
0	Part A LT = 1 week Lot-for-Lot	Gross requirements Scheduled Receipts Projected available Net requirements Planned order receipt Planned order release			60		70
0	Part F LT = 1 week Lot-for-Lot	Gross requirements Scheduled Receipts Projected available Net requirements Planned order receipt Planned order release				100	
	Part B LT = 2 weeks Lot Size: 300	Gross requirements Scheduled Receipts Projected available 200 Net requirements Planned order receipt Planned order release					
	Part C LT = 2 weeks Lot-for-Lot	Gross requirements Scheduled Receipts Projected available Net requirements Planned order receipt Planned order release		120			
	Part D LT = 2 weeks Lot Size: 300	Gross requirements Scheduled Receipts Projected available Net requirements Planned order receipt Planned order release	300				
	Part E LT = 3 weeks Lot Size: 500	Gross requirements Scheduled Receipts Projected available 400 Net requirements Planned order receipt Planned order release					

Problem 4.15 Given the product tree (in text), explode, offset, and determine the gross and net requirements. All lead times are one week and the quantities required are shown in ()'s. The master production schedule calls for production of 100 As in week 4 and 50 in week 5. There is a scheduled receipt of 300 Bs in week 1 and 200 Ds in week 3. There are also 20 As available.

Code		WEEK	1	2	3	4	5
	Part A LT = 1 week Lot-for-Lot	Gross requirements Scheduled Receipts Projected available 20 Net requirements Planned order receipt Planned order release					
	Part B LT = 1 week Lot-for-Lot	Gross requirements Scheduled Receipts Projected available Net requirements Planned order receipt Planned order release					
	Part C LT = 1 week Lot-for-Lot	Gross requirements Scheduled Receipts Projected available Net requirements Planned order receipt Planned order release					
	Part D LT = 1 week Lot-for-Lot	Gross requirements Scheduled Receipts Projected available Net requirements Planned order receipt Planned order release					
	Part E LT = 1 week Lot-for-Lot	Gross requirements Scheduled Receipts Projected available Net requirements Planned order receipt Planned order release					

Problem 4.16

Code		WEEK	1	2	3	4	5
	Part A LT = 1 week Lot-for-Lot	Gross requirements Scheduled Receipts Projected available Net requirements Planned order receipt Planned order release					
	Part B LT = 1 week Lot-for-Lot	Gross requirements Scheduled Receipts Projected available Net requirements Planned order receipt Planned order release					
	Part C LT = 1 week Lot-for-Lot	Gross requirements Scheduled Receipts Projected available Net requirements Planned order receipt Planned order release					
	Part D LT = 1 week Lot-for-Lot	Gross requirements Scheduled Receipts Projected available Net requirements Planned order receipt Planned order release					
	Part E LT = 1 week Lot Size: 500	Gross requirements Scheduled Receipts Projected available Net requirements Planned order receipt Planned order release					
	Part F LT = 1 week Lot-for-Lot	Gross requirements Scheduled Receipts Projected available Net requirements Planned order receipt Planned order release					

Problem 4.17: Complete the following MRP record. Lead Time is four weeks and the Lot Size is 200. What will happen if the gross requirements in week 3 are increased to 150 units? As a planner what actions can you take?

Initial MRP

Week		1	2	3	4	5
Gross Requirements		50	125	100	60	40
Scheduled Receipts			200		200	
Projected Available	100					
Net Requirements						
Planned Order Receipt						
Planned Order Release						

Revised MRP

Week		1	2	3	4	5
Gross Requirements						
Scheduled Receipts						
Projected Available	100					
Net Requirements						
Planned Order Receipt						
Planned Order Release						

Problem 4.18: Its Monday morning and you have just arrived at work. Complete the following MRP record as it would appear Monday AM. Lead Time is two weeks, Lot Size is 100.

Initial MRP

Week		1	2	3	4	5
Gross Requirements		70	40	80	50	40
Scheduled Receipts		100				
Projected Available	50					
Net Requirements						
Planned Order Receipt						
Planned Order Release						

During the week, the following events occur. Enter them in the MRP record.

a. The planned order for 100 in week 1 is released
b. Thirty of the scheduled receipts for week 1 are scrapped.
c. An order for 20 is received for delivery in week 3.
d. An order for 40 is received for delivery in week 6.
e. The gross requirements of 70 in week 1 are issued.

MRP record at the end of week 1

Week		1	2	3	4	5
Gross Requirements						
Scheduled Receipts						
Projected Available						
Net Requirements						
Planned Order Receipt						
Planned Order Release						

Beginning on Page 140 Problem 5.13 A work center has the following open and planned orders for week 4. Calculate the total standard time required (load).

		Order Quantity	Setup Time Hours	Run time (hrs./ piece)	Total time (hours)
Releases Orders	120	300	1.00	0.10	
	340	200	2.50	0.30	
Planned Orders	560	300	3.00	0.25	
	780	500	2.00	0.15	

Problem 5.14 A work center has the following open and planned orders for week 4. Calculate the total standard time required (load).

		Order Quantity	Setup Time Hours	Run time (hrs./ piece)	Total time (hours)
Releases Orders	125	150	0.25	0.10	
	345	50	0.40	0.05	
Planned Orders	565	75	1.00	0.20	
	785	35	0.50	0.15	
Total Time (standard hours)					

Problem 5.15 Using the information in the following route file, open order file, and MRP planned orders, calculate the load on the work center.

Routing Part 123: Set up time = 2 std hrs.
Run time per piece = 3 std hrs per piece

Part 456: Set up = 3 std hrs.
Run time per piece = 1 std hr per piece

Open orders

Week	1	2	3
123	12	8	5
456	15	5	5

Planned Orders for parts

Week	1	2	3
123	0	50	10
456	0	10	15

Load report

Week		1	2	3
Releases Orders	123			
	456			
Planned Orders	123			
	456			
Total Load				

Problem 5.16 Complete the following load report and suggest possible courses of action.

Week	18	19	20	21	Total
Releases Orders	145	155	90	60	450
Planned Orders	0	0	80	80	160
Total Load					
Rated Capacity					
(Over)/Under					

Problem 5.17: Back schedule the following shop order. All times are given in days. Move time between operations is one day, and wait time is one day. Due date is day 200. Assume orders start at the beginning of a day and finish at the end of a day.

Operation Number	Work Center	Operation Time (days)	Queue Time (days)	Arrival Date	Finish Date
10	111	2	3		
20	130	4	5		
30	155	1	2		
	Stores			150	

Problem 5.18: Back schedule the following. Move time between operations is one day, and wait time is one day. Due date is day 200. Assume orders start at the beginning of a day and finish at the end of a day.

Operation Number	Work Center	Operation Time (days)	Queue Time (days)	Arrival Date	Finish Date
10	111				
20	130				
30	155				
	Stores			200	

Beginning on Page 176 Problem 6.16 Complete the following input/output report. What are the planned and actual backlogs at the end of period 4?

Period	1	2	3	4	Total
Planned Input	35	37	36	41	
Actual input	33	33	31	43	
Cumulative Variance					

Planned Output	40	40	40	40	
Actual Output	39	35	40	38	
Cumulative Variance					

Planned Backlog	32					
Actual Backlog	32					

Problem 6.17: Complete the following input/output report. What is the backlog at the end of period 5?

Period	1	2	3	4	5	Total
Planned Input	78	78	78	78	78	
Actual input	82	80	74	82	84	
Cumulative Variance						

Planned Output	80	80	80	80	80	
Actual Output	87	83	74	80	84	
Cumulative Variance						

Planned Backlog	45						
Actual Backlog	45						

Problem 6.18 Complete the following table to determine the run sequence for each of the sequencing rules.

Job	Process Time	Arrival Date	Due Date	Operation Due Date	Sequencing Rule			
					FCFS	EDD	ODD	SPT
A	5	123	142	133				
B	2	124	144	131				
C	3	131	140	129				

Problem 6.19: Jobs A, B, and C are in queue at work center 10 then to 20. There is no move time, today is day 1. If the jobs are scheduled by the earliest due date can they be completed on time?

Job	Process Time (days)		Due Date
	Work Center 10	Work Center 20	
A	7	3	12
B	5	2	24
C	9	4	18

Job	Work Center 10		Work Center 20	
			Start Day	Stop Day
A				
B				
C				

Beginning on Page 225 Problem 8.2: Calculate the three-month moving average forecasts for months 4, 5, 6, and 7.

Month	Actual Demand	Forecast
1	67	
2	75	
3	43	
4	50	
5	77	
6	65	
7		

Problem 8.2: Use the following demand data to:

a. Graph the demand

b. What is your best guess for month 11?

c. Using a three-month moving average calculate the forecasts for months 4, 5, 6, 7, 8, 9, 10, and 11.

Month	Actual Demand	Forecast
1	102	
2	91	
3	95	
4	105	
5	94	
6	100	
7	109	
8	92	
9	101	
10	98	
11		

Problem 8.6: Using exponential smoothing, calculate the forecasts for months 2, 3, 4, 5, and 6. The smoothing constant is 0.2 and the old forecast for month 1 is 245.

Month	Actual Demand	Forecast
1	260	
2	230	
3	225	
4	245	
5	250	
6		

Problem 8.7: Using exponential smoothing, calculate the forecasts for months 2, 3, 4, 5, and 6. The old average for month 3 was 96 and the smoothing constant is 0.2. What is the difference between the two forecasts for month 11?

Month	Actual Demand	Forecast
1	102	
2	91	
3	95	96
4	105	
5	94	
6	100	
7	109	
8	92	
9	101	
10	98	
11		

Problem 8.8: Weekly demand for an item averaged 100 units over the past year. Actual demand for the next eight weeks is shown in what follows:

a. Plot the graph.

b. Letting $\alpha = 0.25$ calculate the smoothed forecast for each week.

c. Comment on how well the forecast is tracking actual demand. Is it lagging or leading actual demand?

Month	Actual Demand	Forecast
1	103	
2	112	
3	113	
4	120	
5	126	
6	128	
7	138	
8	141	
9		

Problem 8.17: The Fast Track Ski Shoppe sells ski goggles during the four months of the ski season. Average demand follows:

a. Calculate the deseasonalized sales and the seasonal index for each of the four months.

b. If next year's demand is forecast at 1200 Pairs of goggles, what will b the forecast sales for each month?

Month	Average Past Demand	Seasonal Index	Forecast Demand Next Year
December	300		
January	400		
February	150		
March	150		
Total			

Problem 8.18: Calculate the mean absolute deviation.

Period	Forecast	Actual Demand	Absolute Deviation
1	100	85	
2	100	105	
3	100	120	
4	100	100	
5	100	90	
Total			

Problem 8.19: Calculate the mean absolute deviation.

Period	Forecast	Actual Demand	Absolute Deviation
1	100	105	
2	105	95	
3	110	90	
4	115	135	
5	120	105	
6	125	120	
Total	675	650	

Problem 8.20: A company uses a tracking signal trigger of +/- 4 to decide whether a forecast should be reviewed. Given the following history, determine in which period the forecast should be reviewed. MAD for the item is 15. Is there any indication that the forecast should be revised?

Period	Forecast	Actual	Deviation	Cumulative Deviation	Tracking Signal
1	100	110			
2	105	90			
3	110	85			
4	115	110			
5	120	105			
6	125	95			

Beginning on Page 251 Problem 9.7: A company manufactures and sells a seasonal product. Based on the sales forecast that follows, calculate a level production plan, quarterly ending inventories, and average quarterly inventories. Assume that the average quarterly inventory is the average of the starting and ending inventory for the quarter. If inventory carrying costs are $3 per unit per quarter, what is the annual cost of carrying this anticipation inventory? Opening and closing inventories are zero.

	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Totals $
Sales	1000	2000	3000	2000	
Production					
Ending Inventory					
Average Inventory					
Inventory Cost					

Problem 9.8: Given the following data, calculate a level production plan, quarterly ending inventory, and average quarterly inventory. If inventory carrying costs are $6 per unit per quarter, what is the annual carrying cost? Opening and closing inventories are zero.

	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Totals $
Sales	5000	8000	8000	10000	
Production					
Ending Inventory					
Average Inventory					
Inventory Cost					

Problem 9.9: Given the following data, calculate a level production plan, quarterly ending inventory, and average quarterly inventory. If inventory carrying costs are $3 per unit per quarter, what is the annual carrying cost? Opening and closing inventories are zero.

	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Totals $
Sales	3000	4000	7000	6000	
Production					
Ending Inventory					
Average Inventory					
Inventory Cost					

Problem 9.17: Over the past year, a company has sold the following ten items. The following table shows the annual sales in units and the cost of each item.

(a) Calculate the annual dollar usage of each item.
(b) List the items according to their total annual dollar usage.
(c) Calculate the cumulative annual dollar usage and the cumulative percentage of items.
(d) Group the items into A, B, and C groups based on percentage of annual dollar usage.

Part Number	Annual Unit Usage	Unit Cost $	Annual Cost $
1	21,000	1	
2	5000	40	
3	1600	3	
4	12,000	1	
5	1000	100	
6	50	50	
7	800	2	
8	10,000	3	
9	4000	1	
10	5000	1	

Problem 9.18: Analyze the following data to produce an ABC classification based on annual dollar usage.

Part Number	Annual Unit Usage	Unit Cost $	Annual Cost $
1	200	10	
2	15,000	4	
3	60,000	6	
4	15,000	15	
5	1400	10	
6	100	50	
7	25,000	2	
8	700	3	
9	25,000	1	
10	7500	1	

Beginning on Page 300 Problem 11.3: Given the following data, calculate the average (x-bar) of the distribution and the standard deviation (sigma).

Period	Actual Demand	Deviation	Deviation Squared
1	500		
2	600		
3	425		
4	450		
5	600		
6	575		
7	375		
8	475		
9	525		
10	475		
Total			

Problem 11.4: Given the following data, calculate the average (x-bar) demand and the standard deviation (sigma) about the average.

Period	Actual Demand	Deviation	Deviation Squared
1	1700		
2	2100		
3	1900		
4	2200		
5	2000		
6	1800		
7	2100		
8	2300		
9	2100		
10	1800		
Total			

Problem 11.15: Management has stated that it will tolerate one stock out per year. The forecast of annual demand for a particular SKU is 100,000 units, and it is ordered in quantities of 10,000 units. The lead time is two weeks. Sales history for the past ten weeks follows. Calculate:

a. Sigma for the history time interval.
b. Sigma for the lead time interval.
c. The service level.
d. The safety stock required for this service level.
e. The order point.

Period	Actual Demand	Deviation	Deviation Squared
1	2100		
2	1700		
3	2600		
4	1400		
5	1800		
6	2300		
7	2200		
8	1600		
9	2100		
10	2200		
Total			