Solutions to Problems

12-1. $D = 1500$

$C_o = \$625$

$C_c = \$130$

a. $Q = \sqrt{\frac{2C_oD}{C_c}} = \sqrt{\frac{2(625)(1500)}{130}} = 120.1$

b. $TC = \frac{C_oD}{Q} + \frac{C_cQ}{2}$

$= \frac{(625)(1500)}{120.1} + \frac{(130)(120.1)}{2} = \$15{,}612.49$

c. $\frac{D}{Q} = \frac{1500}{120.1} = 12.49$ orders

d. $\frac{364}{12.49} = 29.14$ days

Solutions to Problems

13.1 a. ***Pure strategy – Chase Demand*** (Note: Level production is not feasible because of April's demand)

Input:	Beg. Wkrs	25	Regular	$9	Hiring	$1,500		
	Units/wkr	1000	Overtime	$10	Firing	$1,500	*Cost:*	**$2,457,000**
	Beg. Inv.	0	Subk	$12	Inventory	$2		

Month	Demand	Reg	OT	Subk	Inv	#Wkrs	#Hired	#Fired
Apr	60,000	60,000	0	0	0	60	35	0
May	22,000	22,000	0	0	0	22	0	38
Jun	15,000	15,000	0	0	0	15	0	7
July	46,000	46,000	0	0	0	46	31	0
Aug	80,000	80,000	0	0	0	80	34	0
Sept	15,000	15,000	0	0	0	15	0	65
Total	238,000	238,000	0	0	0		100	110

b. ***Mixed Strategy – Keep current workforce and supplement with OT and Subk***
(Note: this is one mixed strategy; answers will vary)

Month	Demand	Reg	OT	Subk	Inv	#Wkrs	#Hired	#Fired
Apr	60,000	25,000	25,000	10,000	0	25	0	0
May	22,000	25,000	0	0	3,000	25	0	0
Jun	15,000	25,000	0	0	13,000	25	0	0
July	46,000	25,000	8,000	0	0	25	0	0
Aug	80,000	25,000	25,000	30,000	0	25	0	0
Sept	15,000	15,000	0	0	0	15	0	10
Total	238,000	140,000	58,000	40,000	16,000		0	10

Cost: **$2,367,000**

16-3. ***Initial matrix:***

17	10	15	16	20
12	9	16	9	14
11	16	14	15	12
14	10	10	18	17
13	12	9	15	11

Row reduction:

7	0	5	6	10
3	0	7	0	5
0	5	3	4	1
4	0	0	8	7
4	3	0	6	2

Column reduction:

7	0	5	6	9
3	0	7	0	4
0	5	3	4	0
4	0	0	8	6
4	3	0	6	1

Modify matrix:

6	0	5	5	8
3	1	8	0	4
0	6	4	4	0
3	0	0	7	5
3	3	0	5	0

Make assignments:

6	0	5	5	8
3	1	8	0	4
0	6	4	4	0
3	0	0	7	5
3	3	0	5	0

Calculate performance:

Product	Machine				
	A	B	C	D	E
1	17	10	15	16	20
2	12	9	16	9	14
3	11	16	14	15	12
4	14	10	10	18	17
5	13	12	9	15	11

Total time = 51 hours

16-4

16-8. FCFS

Job	Processing time	Duedate	Slack
A	3	10	7
B	10	12	2
C	2	25	23
D	4	8	4
E	5	15	10
F	8	18	10
G	7	20	13

SPT

Job	Processing time	Duedate	Slack
C	2	25	23
A	3	10	7
D	4	8	4
E	5	15	10
G	7	20	13
F	8	18	10
B	10	12	2

Job	Start time	Processing time	Completion Time	Duedate	Tardiness
A	4	3	7	10	0
B	7	10	17	12	5
C	17	2	19	25	0
D	19	4	23	8	15
E	23	5	28	15	13
F	28	8	36	18	18
G	36	7	43	20	23
Average			24.71		10.57

Job	Start time	Processing time	Completion Time	Duedate	Tardiness
C	4	2	6	25	0
A	6	3	9	10	0
D	9	4	13	8	5
E	13	5	18	15	3
G	18	7	25	20	5
F	25	8	33	18	15
B	33	10	43	12	31
Average			21.00		6.86

DDATE

Job	Processing time	Duedate	Slack
D	4	8	4
A	3	10	7
B	10	12	2
E	5	15	10
F	8	18	10
G	7	20	13
C	2	25	23

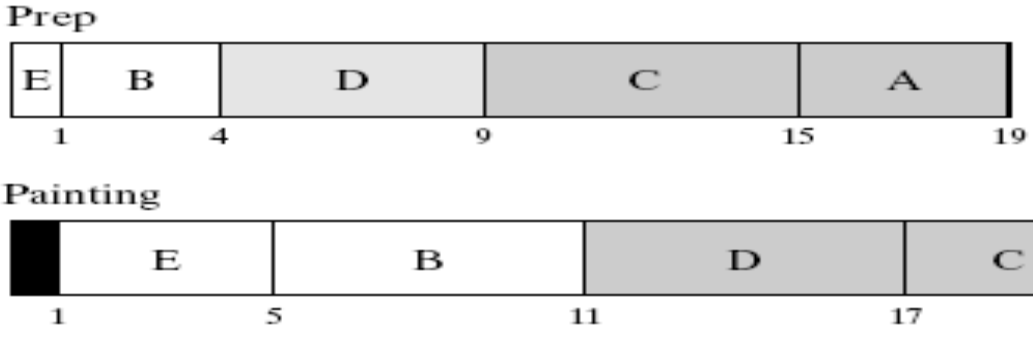
Job	Start time	Processing time	Completion Time	Duedate	Tardiness
D	4	4	8	8	0
A	8	3	11	10	1
B	11	10	21	12	9
E	21	5	26	15	11
F	26	8	34	18	16
G	34	7	41	20	21
C	41	2	43	23	18
Average			26.29		10.86

SLACK

Job	Processing time	Duedate	Slack
B	10	12	-2
D	4	8	0
A	3	10	3
E	5	15	6
F	8	18	6
G	7	20	9
C	2	25	19

Job	Start time	Processing time	Completion Time	Duedate	Tardiness
B	4	10	14	12	2
D	14	4	18	8	10
A	18	3	21	10	11
E	21	5	26	15	11
F	26	8	34	18	16
G	34	7	41	20	21
C	41	2	43	25	18
Average			28.14		12.71

16-15. Sequence: E, B, D, C, A



Makespan = 23