HW5

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Question 1

1) Plan 1

Plan 1									
Month	Production Days		Production /day	Production		Total Production	Forcasted Demand	Inventory Change	Inventory balance with 100 in hand
	RT	OT		RT	OT				
Jan	22	3	10	220		220	100	120	220
Feb	18	4	10	180		180	150	30	250
Mar	23	4	10	230		230	175	55	305
Apr	21	3	10	210		210	190	20	325
May	22	5	10	220		220	220	0	325
Jun	21	5	6	126		126	230	-104	221
Jul	20	4	6	120		120	250	-130	118
Aug	20	3	6	120		120	280	-160	-42
Sep	22	4	10	220		220	260	-40	-82
Oct	22	4	10	220		220	245	-25	-107
Nov	21	3	10	210		210	220	-10	-117
Dec	20	3	10	200		200	180	20	-97
Total				2276					

Hiring/Layoff Costs = 100+150 =250
Inventory Cost = (220+250+305+325+325+221+118)*25=44100
Shortage Cost =-(-42-82-107-117-97)*80=35600
Production Cost =2276*200=455200
Total Cost = 535150

2) Plan 2

Plan 2									
Month	Production Days		Production /day	Production		Total Production	Forcasted Demand	Inventory Change	Inventory balance with 100 in hand
	RT	OT		RT	OT				
Jan	22	3	10	220		220	100	120	220
Feb	18	4	10	180		180	150	30	250
Mar	23	4	10	230		230	175	55	305
Apr	21	3	6	126		126	190	-64	241
May	22	5	6	132		132	220	-88	153
Jun	21	5	6	126		126	230	-104	49
Jul	20	4	6	120		120	250	-130	-81
Aug	20	3	8	160	24	184	280	-96	-177
Sep	22	4	8	176	32	208	260	-52	-229
Oct	22	4	10	220	40	260	245	15	-214
Nov	21	3	10	210	30	240	220	20	-194
Dec	20	3	10	200	30	230	180	50	-144
Total				2100	156				

Hiring/Layoff Costs = 100+150 +150=400

Inventory Cost = (220+250+305+241+153+49)*25=30450

Shortage Cost =-(-81-177-229-214-194-144)*80=83120

Production Cost =2100*200+156*350=474600

Total Cost = 588570

3) Plan 3

Plan 3								
Month	Production Days		Production /day	Production		Total Production	Forcasted Demand	Inventory Change	Inventory balance with 100 in hand
	RT	OT		RT	OT				
Jan	22	3	10	220		220	100	120	220
Feb	18	4	10	180		180	150	30	250
Mar	23	4	10	230		230	175	55	305
Apr	21	3	10	210		210	190	20	325
May	22	5	6	132		132	220	-88	237
Jun	21	5	6	126		126	230	-104	133
Jul	20	4	6	120	24	144	250	-106	27
Aug	20	3	10	200	30	230	280	-50	-23
Sep	22	4	10	220	40	260	260	0	-23
Oct	22	4	10	220	40	260	245	15	-8
Nov	21	3	10	210	30	240	220	20	12
Dec	20	3	10	200	30	230	180	50	62
Total				2268	194				

Hiring/Layoff Costs = 100+150 =250
Inventory Cost = (1571)*25=39275
Shortage Cost =-(-54)*80=4320
Production Cost =2268*200+194*350=521500
Total Cost = 565345

Comparing the costs of all three plans, we find that the total cost of **Plan 1** is min

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Question 2

N.W step:

Capacity

	P1	P2	P3	P4	Final inv.	Slack	Capacity
Initial inventory	20 [0]	[2]	[4]	[6]	[8]	0	~~20~~
P1_in	10 [5]	5 [7]	[9]	[11]	[13]	0	15.
P1_out	[10]	30 [12]	[14]	[16]	[18]	30 [0]	30
P2_in		5 [5]	15 [7]	[9]	[11]	0	20.
P2_out		[10]	30 [12]	[14]	[16]	0	~~30~~
P3_in			5 [7]	20 [9]	[11]	0	25
P3_out			[10]	30 [12]	[14]	0	~~30~~
P4_in				10 [8]	20 [10]	0	30
P4_out				[10]	[12]	0	~~30~~
Demand	30	40	50	60	~~20~~	~~30~~	~~230~~ 230

Demands

we first do North West method to find a feasible solution, then, we use iteratively U-V method to find the optimum solution. I have done this and here I provided the result:

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iteration 5 ⇒ Min Cost = 1610

Capacity

	P1	P2	P3	P4	Final inv.	Slack	Capacity
Initial inventory	(20) 0	2	4	6	8	0	20
P1_in	(10) 5	(5) 7	9	11	13	0	15
P1_out	10	12	14	16	18	30 0	30
P2_in		(20) 5	7	9	11	0	20
P2_out		(15) 10	12	14	16 (15)	0	30
P3_in			7 (25)	9	11	0	25
P3_out			(25) 10	12	14 (5)	0	30
P4_in				8 (30)	10	0	30
P4_out				(30) 10	12	0	30
Demand	30	40	50	60	20	30	230 / 230

Demands

(5)

We do several iteration of U-V method after, we end up the table above. I'll provide the process in the middle upon request.

Total minimum Cost: 30x0 + 20x0 + 20x5 + 10x5 + 25x7 + 5x7 + 30x8 + 30x10 + 25x10 + 15x10 + 5x14 + 15x16 = 1610

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