9\2\11

$n = 4$ $\quad$ $\underline{d} = (4, 5, 4, 5)$

$H = 4$ $\quad$ $c(x) = x(30 - x)$

x_1	x_2	x_3	x_4
8	1	8	1

Total Cost = 418

	1		2		3		4	
i\n	f	x	f	x	f	x	f	x
0	410	8	314	9	205	8	125	5
1			301	8	190	7	104	4
2			286	3 or 7	173	6	81	3
3			261	2	154	1 or 5	56	2
4			234	1	125	0	29	1

$i = 0$

$r = 3$

x	cost		
4	104	+	125
5	125	+	104
6	144	+	81
7	161	+	56
8	176	+	29 $= 205^{*}$

$i = \underline{1}$

$r = 3$

$\underline{x}$	$\underline{\text{cost}}$		
3	81	+	125
4	104	+	104
5	125	+	81
6	144	+	56
7	161	+	29 = 190

$i = 2$

$r = 3$

$\underline{x}$	$\underline{\text{cost}}$			
2	56	+	125	
3	81	+	104	
4	104	+	81	
5	125	+	56	
6	144	+	29	$= 173^{*}$

$i = 3$

$r = 3$

$\underline{x}$	$\underline{\text{cost}}$			
1	29	+	125	$= 154^{*}$
2	56	+	104	
3	81	+	81	
4	104	+	56	
5	125	+	29	$= 154^{*}$

$i = 4$

$r = 3$

$\underline{x}$	$\underline{\text{cost}}$
0	$0 + 125 = 125$
1	$29 + 104$
2	$56 + 81$
3	$81 + 56$
4	$104 + 29$

$i = 0$

$r = 2$

$\underline{x}$	$\underline{\text{cost}}$
5	$125 + 205$
6	$144 + 190$
7	$161 + 173$
8	$176 + 154$
9	$189 + 125 = 314^{*}$

$i = 1$

$r = 2$

$\underline{x}$	<u>cost</u>
4	104 + 205
5	125 + 190
6	144 + 173
7	161 + 154
8	176 + 125 = 301

$i = 2$

$r = 2$

x	cost
3	$81 + 205 = 286^*$
4	$104 + 190$
5	$125 + 173$
6	$144 + 154$
7	$161 + 125 = 286^*$

$i = 3$

$r = 2$

$\underline{x}$	$\underline{\text{cost}}$
2	56 + 205 = 261
3	81 + 190
4	104 + 173
5	125 + 154
6	144 + 125

$i = 4$

$r = 2$

$\underline{x}$	$\underline{\text{cost}}$
1	$29 + 205 = 234$
2	$56 + 190$
3	$81 + 173$
4	$104 + 154$
5	$125 + 125$

$i = 0$

$r = 1$

4	104	+	314
5	125	+	301
6	144	+	286
7	161	+	261
8	176	+	234 ÷ 410

$$f_r(i) = \min_x \left[c(x) + f_{r+1}(i+x-d_r) \right]$$

(1) Suppose there are inventory costs.

$\sigma(i, i+x-d_r)$

i: start, $i+x-d_r$: end

σ : stock cost

$$f_r(i) = \min_x \left[c(x) + f_{r+1}(i+x-d_r) \right]$$

$+ \sigma(i, i+x-d_r)$

$$f_r(i) = \min_x \left[c(x) + f_{r+1}(i+x-d_r) \right]$$

ii) Penalty of π per unit per period of delay in meeting demand.

$$f_r(i) = \min_x \left[c(x) + f_{r+1}(i+x-d_r) + \pi\left[d_r - i - x\right]^+ \right]$$

allow i to be negative

$\xi^+ = \max\{0, \xi\}$