

第 10 章 動態規劃

題號 10.3-2

11.3-2.

Let x_n be the number of crates allocated to store n , $p_n(x_n)$ be the expected profit from allocating x_n to store n and s_n be the number of crates remaining to be allocated to stores $k \geq n$. Then $f_n^*(s_n) = \max_{0 \leq x_n \leq s_n} [p_n(x_n) + f_{n+1}^*(s_n - x_n)]$. Number of stages: 3

S3	f3*(S3)	X3*
0	0	0
1	4	1
2	9	2
3	13	3
4	18	4
5	20	5

\ X2		f2(S2, X2)						f2*(S2)	X2*
S2\		0	1	2	3	4	5		
0		0	---	---	---	---	---	0	0
1		4	6	---	---	---	---	6	1
2		9	10	11	---	---	---	11	2
3		13	15	15	15	---	---	15	1,2,3
4		18	19	20	19	19	---	20	2
5		20	24	24	24	23	22	24	1,2,3

\ X1		f1(S1, X1)						f1*(S1)	X1*
S1\		0	1	2	3	4	5		
5		24	25	24	25	23	21	25	1,3

Optimal solution	X1*	X2*	X3*
1	1	2	2
2	3	2	0

題號 10.3-3

11.3-3.

Let x_n be the number of study days allocated to course n , $p_n(x_n)$ be the number of grade points expected when x_n days are allocated to course n and s_n be the number of study days remaining to be allocated to courses $k \geq n$. Then

$$f_n^*(s_n) = \max_{1 \leq x_n \leq \min(s_n, 4)} [p_n(x_n) + f_{n+1}^*(s_n - x_n)].$$

Number of stages: 4

s_4	$f_4^*(s_4)$	x_4^*
1	6	1
2	7	2
3	9	3
4	9	4

	$f_3(s_3, x_3)$					
s_3	1	2	3	4	$f_3^*(s_3)$	x_3^*
2	8	—	—	—	8	1
3	9	10	—	—	13	2
4	11	11	13	—	13	3
5	11	13	14	14	14	3, 4

	$f_2(s_2, x_2)$					
s_2	1	2	3	4	$f_2^*(s_2)$	x_2^*
3	13	—	—	—	13	1
4	15	13	—	—	15	1
5	18	15	14	—	18	1
6	19	18	16	17	19	1

	$f_1(s_1, x_1)$					
s_1	1	2	3	4	$f_1^*(s_1)$	x_1^*
7	22	23	21	20	23	2

Optimal Solution	x_1^*	x_2^*	x_3^*	x_4^*
1	2	1	3	1

題號 10.3-4

11.3-4.

Let x_n be the number of commercials run in area n , $p_n(x_n)$ be the number of votes won when x_n commercials are run in area n and s_n be the number of commercials remaining to be allocated to areas $k \geq n$. Then

$$f_n^*(s_n) = \max_{0 \leq x_n \leq s_n} [p_n(x_n) + f_{n+1}^*(s_n - x_n)].$$

Number of stages: 4

S4	f4*(S4)	X4*
0	0	0
1	3	1
2	7	2
3	12	3
4	14	4
5	16	5

\ X3		f3(S3, X3)							
S3 \		0	1	2	3	4	5	f3*(S3)	X3*
0		0	---	---	---	---	---	0	0
1		3	5	---	---	---	---	5	1
2		7	8	9	---	---	---	9	2
3		12	12	12	11	---	---	12	0,1,2
4		14	17	16	14	10	---	17	1
5		16	19	21	18	13	9	21	2

\ X2		f2(S2, X2)							
S2 \		0	1	2	3	4	5	f2*(S2)	X2*
0		0	---	---	---	---	---	0	0
1		5	6	---	---	---	---	6	1
2		9	11	8	---	---	---	11	1
3		12	15	13	10	---	---	15	1
4		17	18	17	15	11	---	18	1
5		21	23	20	19	16	12	23	1

\ X1		f1(S1, X1)							
S1 \		0	1	2	3	4	5	f1*(S1)	X1*
5		23	22	22	20	18	15	23	0

Optimal solution	X1*	X2*	X3*	X4*
1	0	1	1	3