Review 9

1. Solve the following activity selection problem.

i	1	2	3	4	5	6	7	8	9	10	11
s_i	1	3	0	5	3	5	6	8	8	2	12
f_i	4	5	6	7	8	9	10	11	12	13	14

$$\{ S_1 , S_4 , S_8 , S_{11} \}$$

2. Solve the 0-1 knapsack and fractional knapsack problems for the following example.

item1	item2	item3	Knapsack
10	20	30	50
$60	$100	$120	
6 $/V	5 $/V	4 $/V	
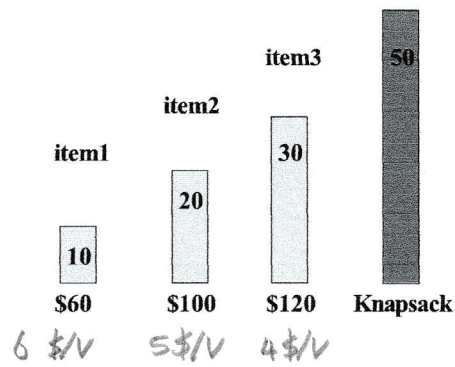
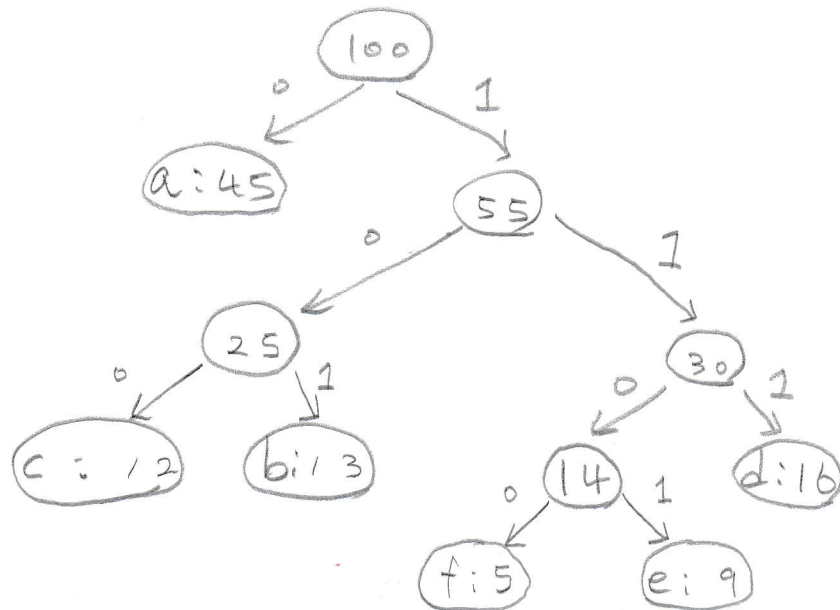(1) 0-1 knapsack

Case: item2 + item3 = $100 + $120 = $220

(2) fractional knapsack

Total = 50V

$6 \cdot 10\$ + 5 \cdot 20\$ + 20 \cdot 4\$ = (160 + 100 + 80)\$ = 240\$$

3. Construct an optimal prefix code (Huffman code) for the following table.

	a	b	c	d	e	f
Frequency (in thousands)	45	13	12	16	9	5
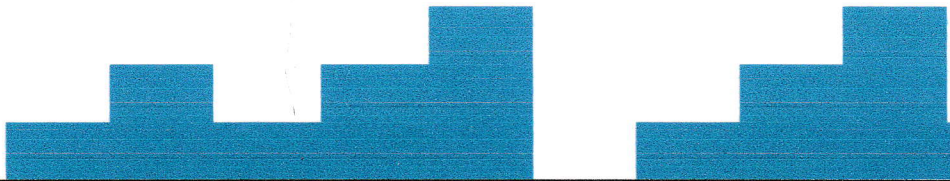
	a	c	b	d	f	e
Encoded	0	100	101	111	1100	1101

Review 10

1. Fill in the following STACK and BINARY COUNTER example.

a) STACK

Stack											
Stack operation	-	PUSH	PUSH	POP	PUSH	PUSH	MULTI POP (S, 5)	PUSH	PUSH	PUSH	MULTI POP (S, 2)
Total amortized cost	0	2	4	4	6	8	8	10	12	14	14
Total actual cost	0	1	2	3	4	5	8	9	10	11	13
Φ	0	1	2	1	2	3	0	1	2	3	1

b) BINARY COUNTER

A[3]	A[2]	A[1]	A[0]	Total amortized cost	Total actual cost	Φ
0	0	0	0	0	0	0
0	0	0	1	2	1	1
0	0	1	0	4	3	1
0	0	1	1	6	4	2
0	1	0	0	8	7	1
0	1	0	1	10	8	2
0	1	1	0	12	10	2
0	1	1	1	14	11	3
1	0	0	0	16	15	1

Review 10-2

1. Fill in the following DYNAMIC TABLE example.

Table									
Table operation	-	Insert	Insert	Insert	Insert	Insert	Insert	Insert	Insert
Number of element	0	1	2	3	4	5	6	7	8
Total amortized cost	0	2	5	8	11	14	17	20	23
Total actual cost	0	1	3	6	7	12	13	14	15
Φ	0	1	2	2	4	2	4	6	8

$2 * T.num - T.size$

$2 \cdot 1 - 1 = 1$ $2 \cdot 2 - 2 = 2$ $2 \cdot 3 - 4 = 2$ $2 \cdot 4 - 4 = 4$ $2 \cdot 5 - 8 = 2$ $2 \cdot 6 - 8 = 4$ $2 \cdot 7 - 8 = 6$ $2 \cdot 8 - 8 = 8$