Necole Goodman

HW # 3

1.

length i	1	2	3	4	5	6	7
price p_i	1	3	9	10	11	14	15
r_i	1	3	9	10	12	18	19

price	1	2	3	4 (length)
(1) 1	1	2	3	4
(3) 2	1	3	4	6
(9) 3	1	3	9	10
(10) 4	1	3	9	10
(11) 5	1	3	9	10
(14) 6	1	3	9	10
(15) 7	1	3	9	10

$r_1 = p_1 = 1$

$r_2 = \max\{p_1 + r, p_2) = 3$

$r_3 = \max\{p_2 + r_2, p_3) = 9$

$r_4 = \max\{p_3 + r_3, p_4) = 10$

$r_5 = \max\{p_4 + r_4, p_5) = 12$

$r_6 = \max\{p_5 + r_5, p_6) = 18$

$r_7 = \max\{p_6 + r_6, p_7\} = 19$

2. X = ABCBDABD, Y = ACBDAABA

x_i \ y_i		A	B	C	B	D	A	B	D
	0	0	0	0	0	0	0	0	0
A	0	1	1	1	1	1	1	1	1
C	0	1	1	2	2	2	2	2	2
B	0	1	2	2	3	3	3	3	3
D	0	1	2	3	3	4	4	4	4
A	0	1	2	3	3	4	5	5	5
A	0	1	2	3	3	4	5	5	5
B	0	1	2	3	3	4	5	6	6
A	0	1	2	3	3	4	5	6	6

∴ Based on the given chart the LCS is ACBDAB.

3. Compute $m[1,1], m[2,2], m[3,3], m[4,4], m[1,2], m[2,3], m[3,4]$, $m[1,3], m[2,4], m[1,4]$.

Let $A_1 = 2\times2$
$A_2 = 2\times3$
$A_3 = 3\times2$
$A_4 = 2\times3$

$m[1,1] = A_1 = \boxed{0}$
2×2

$m[2,2] = A_2 = \boxed{0}$
$= 2\times3$

$m[3,3] = A_3 = \boxed{0}$
$= 2\times3$

$m[4,4] = A_4 = \boxed{0}$
$= 2\times3$

$m[1,2] = A_1 \cdot A_2$
$= (2\times2)(2\times3)$
$= 2\times2\times3 = \boxed{12}$

$m[2,3] = A_2 \cdot A_3$
$= (2\times3)(3\times2)$
$= 2\times3\times2 = \boxed{12}$

$m[3,4] = A_3 \cdot A_4$
$(3\times2)(2\times3)$
$= 3\times2\times3 = \boxed{18}$

$m[1,3] = A_1 \cdot (A_2 \cdot A_3)$
$(2\times2)(2\times3)(3\times2)$
$= m[1,1] + m[2,3] + 2\times2\times2$
$= 0 + 12 + 8 = \boxed{20}$

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$m[1,3] = (A_1 \cdot A_2) \cdot A_3$
$(2\times2)(2\times3)(3\times2)$
$m[3,3] + m[1,2] + 2\times3\times2$
$= 0 + 12 + 12 = 24$

$\therefore \boxed{m[1,3] = 20}$

$m[2,4] = A_2 \cdot (A_3 \cdot A_4)$
$(2\times2)(3\times2)(2\times3)$
$= m[2,2] + m[3,4] + (2\times3\times3)$
$= 0 + 18 + 18 = 36$

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$m[2,4] = (A_2 \cdot A_3) \cdot A_4$
$= (2\times3)(3\times2)(2\times3)$
$= m[4,4] + m[2,3] + (2\times2\times3)$
$= 0 + 12 + 12 = 24$

$\therefore \boxed{m[2,4] = 24}$

$m[1,4] = (A_1 \cdot A_2)(A_3 \cdot A_4)$
$= m[1,2] + m[3,4] + (2\times3\times3)$
$= 12 + 18 + 18 = 48$

$m[1,4] = (A_1 \cdot A_2 \cdot A_3) \cdot A_4$
$= m[4,4] + m[1,3] + (2\times2\times3)$
$= 0 + 20 + 12 = 32$

$m[1,4] = A_1 \cdot (A_2 \cdot A_3\ A_4)$
$= m[1,1] + m[2,4] + 2\times4\times3$
$= 0 + 24 + 24 = 48$

$= 48 > \boxed{32}$

4.

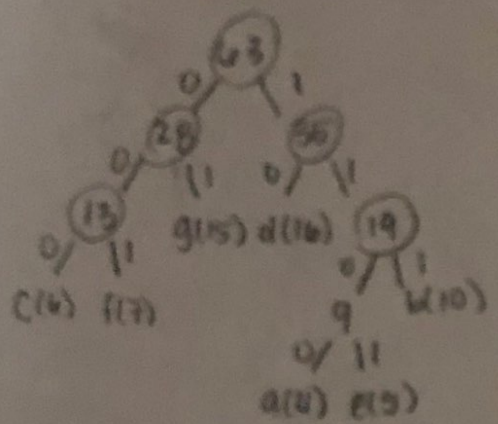
a	b	c	d	e	f	g
4	10	6	16	5	7	15

a) $4+10+6+16+5+7+15=63$

\# of bits needed = 63×3 bits = 189 bits total

b)

d	g	b	f	c	e	a
16	15	10	7	6	5	4



char	freq	code	length
a	4	1100	4
b	10	111	3
c	6	000	3
d	16	10	2
e	5	1101	4
f	7	001	3
g	15	01	2

c)
$$\left.\begin{array}{l} a: 4\times 4 = 16 \\ b: 10\times 3 = 30 \\ c: 6\times 3 = 18 \\ d: 16\times 2 = 32 \\ e: 5\times 4 = 20 \\ f: 7\times 3 = 21 \\ g: 15\times 2 = 30 \end{array}\right\} \text{add values}$$

Huffman code length: 167 bits

5. LCS(i,j)

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if (A[i]== "0" || B[j]== "0")
    return 0
else if (A[i]== B[j])
    arr[i][j]: 1 + LCS (i+1, j+1, arr)
    return arr[i][j]
else
    arr[i][j]: max (LCS (i+1, j+1, arr)
        LCS (i, j+1, arr)
return arr[i][j]
```