Q1) X: [B, A, C, A, B, A]

Y: [O, B, C, B, D, A, B]

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	Ø	B	A	C	A	B	A
Ø	0	0	0	0	0	0	0
O	0	0	0	0	0	0	0
B	0	1←1←1←1←1←1					
C	0	1←1	2←2←2←2				
B	0	1←1	2←2	3←3			
D	0	1←1	2←2	3←3			
A	0	1	2←2←2	3	4		
B	0	1	2←2←2	3	↑4		

- Final common.

Match → Add +1 to top left diagonal.

Non match → Use left or top.

Ans) B C B A

b) X: ~~Mohsin~~ M O H S I N
   Y: A H M A D

	Ø	M	O	H	S	I	N
Ø	0	0	0	0	0	0	0
A	0	0	0	0	0	0	0
H	0	0	0	1 ← 1 ← 1 ← 1
M	0	1 ← 1 ← 1 ← 1 ← 1 ← 1
A	0	1↑ ← 1 ← 1 ← 1 ← 1 ← 1
D	0	1↑ ← 1 ← 1 ← 1 ← 1 ← 1

Longest Subsequence : M.

Shortest Supersequence : $L(x+y) - L(\text{Longest Subsequence})$
                        = 11 - 1
                        = 10.

X: M O H S I N   Y: ~~AH~~ A H M A D   LS: M
   | | | | | | | |

ScS: ~~M~~ A H M O H S I N A D.

| | 0 | 1 | 2 | 3 | 4 |

3) Arr : $[9, 10, 2, 3, 20]$

algo : if (arr[i] > arr[j] && index[i] <= index[j])
{

index[i] += 1;
}

Index . [1 . 1 . 1 . 1 . 1]

j = 0

$[i = 1]$ = index [1 2 1 1 1]

$\frac{[j =]}{[i = 4]}$ index

$[i = 2]$ = index [1 2 1 1 1]

$\begin{bmatrix} j = 2 \\ i = 3 \end{bmatrix}$ = index [1 2 1 2 1]

$\begin{bmatrix} j = 0 \\ i = 4 \end{bmatrix}$ = a
index [1 2 1 2 2]

$\begin{bmatrix} j = 1 \\ i = 4 \end{bmatrix}$ = index [1 2 1 2 3]

= 9, 10, 20

or

2, 3, 20.

insert

Ɉ	" "	P	L	A	S	M	A	
Delete " "	(0)	1	2	3	4	5	6	N → No change
A	1	(1)	2	2	3	4	4	R → Replace
L	2	2	(1)	2	3	4	5	I → Insert
T	3	3	2	(2)	3	4	5	D → Delete
R	4	4	3	3	(3)↑	4	5	
U	5	5	4	4	(4)↑	4	5	
I	6	6	5	5	(5)	5	5	
S	7	7	6	6	(6)	6	6	
M	8	8	7	7	6	(5) ← (6)		

PLASMA → ALTRUISM

R	ALASMA	•1	← cost
N	ALASMA	0	
R	ALTSMA	1	
RI	ALTRᵉMA	1	
I	ALTRUᵉMA	1	
I	ALTRUIᵉMA	1	
N	ALTRUISMA	0	
N	ALTRUISMA	0	
D	ALTRUISM	1	
		6	

e) Name : AHMAD.

$$P_6 \cdot \overset{\overset{P_0 \quad P_1 \quad P_2 \quad P_3 \quad P_u \quad P_k}{}}{\left(2, 25, 3, 16, 1, 5 \right)}$$

A_1	A_2	A_3	A_4	A_5
2×25	25×3	3×16	16×1	1×5

	1	2	3	4	5
1	0	75	171	129	139
2		0	1200	123	248
3			0	48	65
4				0	80
5					0

	1	2	3	4	5
1	0	1	2	2	4
2		0	2	2	4
3			0	3	4
4				0	4
5					0

Main   KMap.

$\cancel{6 \, M[1,2]} \quad M[i,j] = \text{Min}\left(M[i,k] + M[k+i,j] + P_{i-1} \, P_k \, P_j \right).$

$$M[1,2] = (k=1) \left[M[1,1] + M[2,2] + P_0 P_1 P_2 \right]$$
$$= 0 + 0 + (2 \times 25 \times 3) = \underline{75}$$

$$M[2,3] = (k=2) \left[M[2,2] + M[3,3] + P_1 P_2 P_3 \right].$$
$$= 0 + 0 + (25 \times 3 \times 16) = 1200$$

$$M[3,4] = (k=3) \left[M[3,3] + M[4,4] + P_2 P_3 P_4 \right)$$
$$\left(0 + 0 + (3 \times 16 \times 1) \right) = 48$$

$$M[4,5] = (k=4) \left[M[4,4] + M[5,5] + P_3 P_4 P_6 \right)$$
$$= \left(0 + 0 + (16 \times 1 \times 5) \right) = 80$$

$$M[1,3] = (k=1)\left(M[1,1] + M[2,3] + P_0 P_1 P_3 \right)$$
$$(0 + 1200 + (2 \times 25 \times 16)) = 2000$$

$$\checkmark (k=2)\left(M[1,2] + M[3,3] + P_0 P_2 P_3 \right)$$
$$(75 + 0 + (2 \times 3 \times 16)) = 171.$$

$$M[2,4] = (k=2)\left(M[2,2] + M[3,4] + P_1 P_2 P_4 \right)$$
$$(0 + 48 + (25 \times 3 \times 1)) = 123$$

$$(k=3)\left(M[2,3] + M[4,4] + P_1 P_3 P_4 \right)$$
$$(1200 + 0 + (25 \times 16 \times 1)) = 1600$$

$$M[3,5] = (k=3)\left(M[3,3] + M[4,5] + P_2 P_3 P_5 \right)$$
$$(0 + 80 + (3 \times 16 \times 5)) = \underline{320}$$

$$\checkmark (k=4)\left(M[3,4] + M[5,5] + P_2 P_4 P_5 \right)$$
$$(48 + 0 + (3 \times 1 \times 5)) = 65.$$

$M[1,4] : (k=1) \left(M[1,1] + M[2,4] + P_0 P_1 P_4 \right)$

$(0 + 123 + (2 \times 25 \times 1)) = 173.$

✓ $(k=2) \left(M[1,2] + M[3,4] + P_0 P_2 P_4 \right)$

$(75 + 48 + (2 \times 3 \times 1)) = 129.$

$(k=3) \left(M[1,3] + M[4,4] + P_0 P_3 P_4 \right)$

$= (171 + 0 + (2 \times 16 \times 1)) = 203.$

$M[2,5] : (k=2) \left(M[2,2] + M[3,5] + P_1 P_2 P_5 \right)$

$(0 + 65 + (25 \times 3 \times 5)) = 440.$

$(k=3) \left(M[2,3] + M[4,5] + P_1 P_3 P_5 \right)$

$(1200 + 80 + (25 \times 16 \times 5)) = 3280$

✓ $(k=4) \left(M[2,4] + M[5,6] + P_1 P_4 P_5 \right)$

$(123 + 0 + (25 \times 1 \times 5)) = 248.$

$w = 5-1$

$11 - 8 = 3$

v_i	w_i	0	1	2	3	4	5	
		0	0	0	0	0	0	
3	1	0	3	3	3	3	3	←
5	2	0	3	5	8	8	8	
4	3	0	3	5	8	8	9	
8	4	0	3	5	8	8	11	←
10	5	0	3	5	8	8	11	

14 2 6

w_i	1	2	3	4	5
	1	0	0	1	0

Total value = $11

Total weight used = 1+4 = 5 kg

ABCDEFGHI
123456789

LMNO
12 13 14 15
MIRZA

MO H
13 15 8
AHM ALI
18 13 129

AHM
18 13

S = 3, 8, 12, 13, 18, 18, 9

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	05	16	17	18	19	20	21	(22)
23	T	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
1	T	T	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
8	T	T	F	F	F	F	F	F	T	T	F	F	F	F	F	F	F	F	F	F	F	F	F
23	T	T	F	F	F	F	F	F	T	T	T	F	F	F	T	T	F	F	F	F	F	F	T
9	T	T	T	F	F	F	F	F	T	T	T	F	F	T	T	T	T	F	F	F	F	T	T
12	T	T	T	F	F	F	F	F	T	T	T	T	F	T	T	T	T	T	F	F	F	T	T
9	T	T	T	F	F	F	F	F	T	T	T	T	T	T	T	T	T	T	F	T	T	T	T

Elements = 22

yes it is possible

$1 + 8 + 13 = 22$

↑ x elements

$1 + 12 + 9 = 22$

6 elements

$\sum x \text{ elements} = 22$

$6 - \sum x \text{ elements} = 22$

h)

Log

Length	1	2	3	4	5	6	7	8
Price	1	5	8	9	10	16	18	20.

Len(i)	1	2	3	4	5	6	7	8
Len Opt	1	5	8	10	13	16		

Opt

$$\text{Opt } len(i) = \max \{ P_k + Opt(i-k) \}$$

Opt 1

$$len(i) = \max \{ P_1 \} = 1.$$
$$1 \le k \le 1$$

$$Opt\ 2 = \max \begin{cases} P_1 + Opt(1) \\ P_2 \end{cases} = 1+1 = 2 \\ = 5 \checkmark.$$

$$Opt\ 3 = \max \begin{cases} P_1 + Opt(2) \\ P_2 + Opt(1) \\ P_3 \end{cases} = 1 + 5 = 6 \\ = 5+1 = 6 \\ = 8 \checkmark.$$

$$Opt\ 4 = \max \begin{cases} P_1 + Opt(3) \\ P_2 + Opt(2) \\ P_3 + Opt(1) \\ P_4 \end{cases} = 1 + 8 = 9 \\ = 5 + 5 = 10 \checkmark. \\ = 8 + 1 + 9 \\ = 9$$

$$\text{Opt 5 : max} \begin{cases} P_1 + Opt(4) \\ P_2 + Opt(3) \\ P_3 + Opt(2) \\ P_4 + Opt(1) \\ P_5 \end{cases} \begin{aligned} &= 1 + 10 = 11 \\ &= 5 + 8 = 13 ✓ \\ &= 7 \quad 8 + 5 = 13 ✓ \\ &= 9 + 1 \neq 10 \\ &= 10 \end{aligned}$$

$$\text{Opt 6 . max} \begin{cases} P_1 + Opt(5) \\ P_2 + Opt(4) \\ P_3 + Opt(3) \\ P_4 + Opt(2) \\ P_5 + Opt(1) \\ P_6 \end{cases} \begin{aligned} &= 1 + 13 = 14 \\ &= 5 + 10 = 15 \\ &= 8 + 8 \neq 16 ✓ \\ &= 9 + 5 = 14 \\ &= 10 + 1 = 11 \\ &= 16 ✓ \end{aligned}$$

$$\text{Opt 7 = max} \begin{cases} P_1 + Opt(6) \\ P_2 + Opt(5) \\ P_3 + Opt(4) \\ P_4 + Opt(3) \\ P_5 + Opt(2) \\ P_6 + Opt(1) \\ P_7 \end{cases} \begin{aligned} &1 + 16 = 17 \\ &5 + 13 \neq 18 ✓ \\ &8 + 10 \neq 18 ✓ \\ &9 + 8 = 17 \\ &10 + 5 = 15 \\ &16 + 1 = 17 \\ &18 ✓ \end{aligned}$$

$$\text{Opt 8 = max} \begin{cases} P_1 + Opt(7) \\ P_2 + Opt(6) \\ P_3 + Opt(5) \\ P_4 + Opt(4) \\ P_5 + Opt(3) \\ P_6 + Opt(2) \\ P_7 + Opt(1) \\ P_8 \end{cases} \begin{aligned} &1 + 18 = 19 \\ &5 + 16 = 21 ✓ \\ &8 + 13 = 21 ✓ \\ &9 + 10 = 19 \\ &10 + 8 = 18 \\ &16 + 5 = 21 ✓ \\ &18 + 1 = 19 \\ &20 \end{aligned}$$

Solution: 1.

$$\left.\begin{array}{c} 2 \\ \\ 6 \end{array}\right]$$
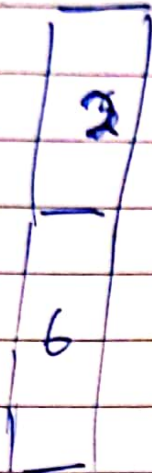
Size : 2,6.

'i'	0	1	2	3	4	5	6	7	8	9	10	11	12	13
1	0←	1	2	3	4	5	6	7	8	9	10	11	12	13
5	0	1	2	3	4	1←	2	3	4	5	2	3	4	5
6	0	1	2	3	4	1	1	2	3	4	2	2●	2	3
8	0	1	2	3	4	1	1	2	1	2	2	2	2	2←

$13-8 = 5$

$(5,8) = 13$

$\min\left(arr[i-1], arr\right.$

i) Tabular Dynamic Programming

Dictionary : { i, like, ice, cream, icecream, mobile, apple }

String { ilikeapple }

		0	1	2	3	4	5	6	7	8	9	10
		∅	i	l	i	k	e	a	p	p	l	e
0	∅	O	O	O	O	O	O	O	O	O	O	O
1	i	O	(T)	F	F	F	(T)	F	F	F	F	(T)
2	l	O		F	F	F	(T)	F	F	F	F	(T)
3	i	O			(T)	F	F	F	F	F	F	P
4	k	O				F	F	F	F	F	F	F
5	e	O					F	F	F	F	F	F
6	a	O						F	F	F	F	(T)
7	p	O							F	F	F	F
8	p	O								F	F	F
9	l	O									F	F
10	e	O										F

M[0,10] = (i) (like) (apple)

$$M[1,1] \quad M[2,5] \quad M[6,10]$$
$$T \quad \{\{ \quad T \quad \{\{ \quad T$$

Therefore

→ M[9,10] = True

Hence input is possible.