day / date:

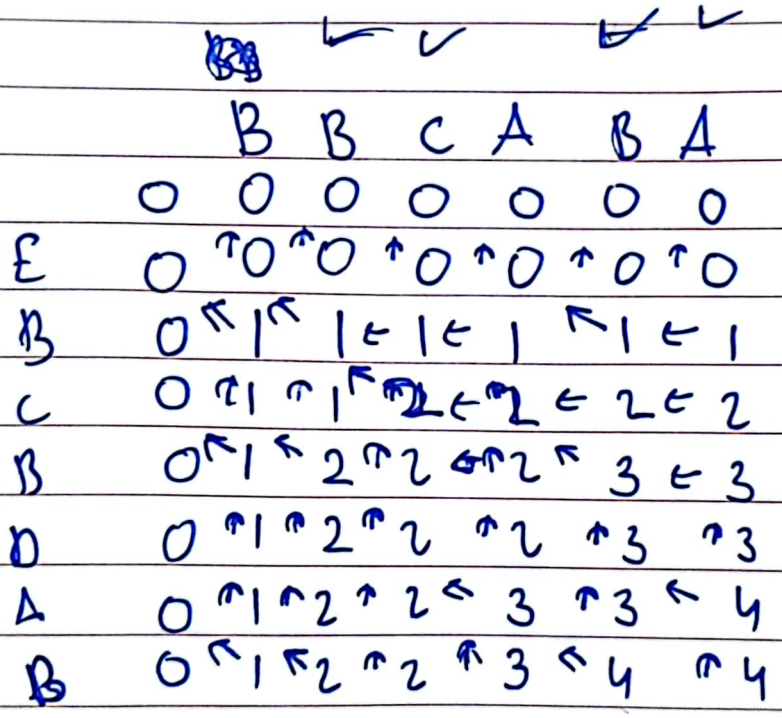
Assignment 3
Q1

name = Bilal

name = Ehsan

Q) X = BBCABA

Y = EBCBDAB



length = 4

BCBA

day / date:

Algo Assignment 3

Q2

X: HUZAIFA = 7

Y: EHAAB = 5

			H	U	Z	A	I	F	A
		0	1	2	3	4	5	6	7
E	1	←	2	3	4	5	6	7	8
H	2	↑	2 ←	3 ←	4	← 5	← 6	← 7	← 8
A	3		3 ←	4 ←	5	↖ 5	← 6	← 7	← 8
A	4		4 ←	5 ←	6	← ↖ 6	← 7	← 8	↖ 8
B	5	↑	5 ←	6 ←	7	↑ 7	← 8	← 9	↑ **9**

→ length of SCS

HUZAIFA

EHAAB

EHUZAIFAB → 9

(c) Longest Increasing Sub sequence :

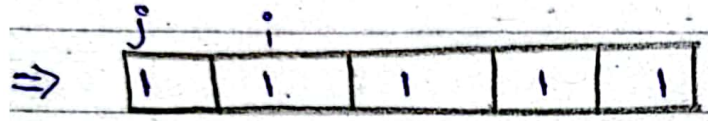
Conditions:

① $arr[i] < arr[j]$

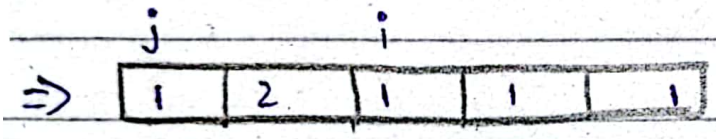
② $T[i] = \max(T[i], T[j] + 1)$

3172 3403

(2, 10, 2, 3, 20)

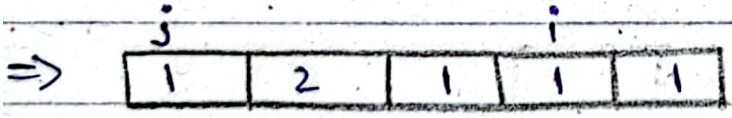


10 > 2, $T[i] = \max(1, 1+1)$

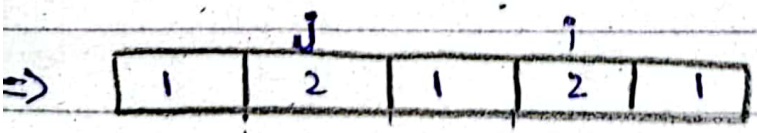


2 ≯ 2

2 ≯ 10



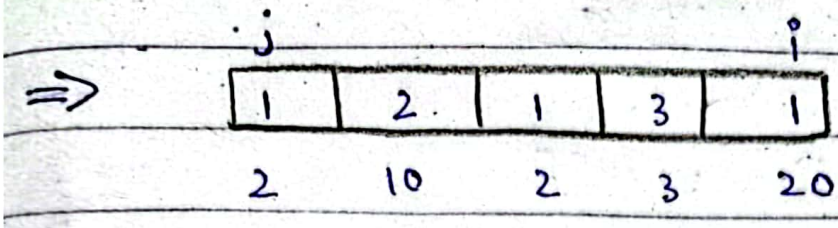
3 > 2, $T[i] = \max(1, 1+1)$



3 ≯ 10

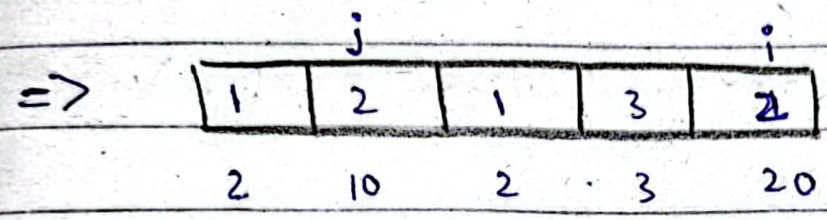
j i

3 > 2, $T[i] = \max(2, 2+1)$



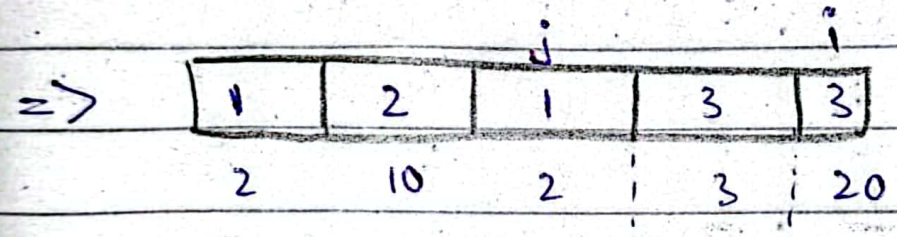
$20 > 2$

$T[i] = \max(1, 1+1)$



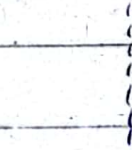
$20 > 10$

$T[i] = \max(2, 2+1)$



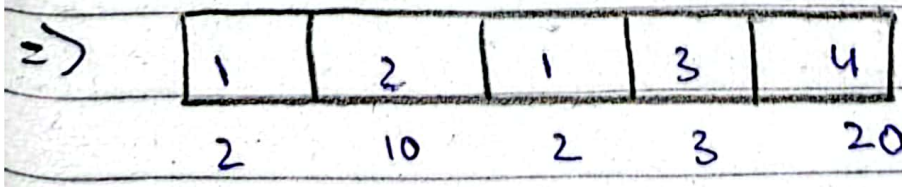
$20 > 2$

$T[i] = \max(3, 1+1)$



$20 > 3$

$T[i] = \max(3, 3+1)$



(d) Levenshtein - distance

Condition : if a[i] == a[j]

prev diagonal

else

min (horizontal , diagonal, vertical) + 1

#	i	E	L	E	P	H	A	N	T
# j	0	1	2	3	4	5	6	7	8
R	1	1	2	3	4	5	6	7	8
E	2	1	2	2	3	4	5	6	7
L	3	2	1	2	3	4	5	6	7
E	4	3	2	1	2	3	4	5	6
V	5	4	3	2	2	3	4	5	6
# A	6	5	4	3	3	3	3	5	6
N	7	6	5	4	4	4	4	3	4
T	8	7	6	5	5	5	5	4	3

21K-3403
(e,g,h)

ASSIGNMENT # 3

Date:

Q5. e)

$p_0 = 2, p_1 = 25, p_2 = 3, p_3 = 16, p_4 = 1, p_5 = 5$

(Bilab) Chaab

A_1, A_2, A_3, A_4, A_5

$(2 \times 25)\ (25 \times 3)\ (3 \times 16)\ (16 \times 1)\ (1 \times 5)$

m[i,j]	1	2	3	4	5
1	-	150	246	173	183
2	-	-	1200	123	248
3	-	-	-	48	63
4	-	-	-	-	80
5	-	-	-	-	-

$m[1,2] = 2 \times 25 \times 3 = 150$

$m[2,3] = 25 \times 3 \times 16 = 1200$

$m[3,4] = 3 \times 16 \times 1 = 48$

$m[4,5] = 16 \times 1 \times 5 = 80$

$m[1,3]$:

$k = 1$

$i = 1$

$j = 3$

$= m[1,1] + m[2,3] + p_0 p_1 p_3$

$= 0 + 1200 + (2)(25)(16)$

$= 2000$

$k = 2$

$i = 1$

$j = 3$

$= m[1,2] + m[3,3] + p_0 p_2 p_3$

$= 150 + 0 + 2(3)(16)$

$= 246$

Date:

$m[2,4]$:

$k = 2$	$k = 3$
$i = 2$	$i = 2$
$j = 4$	$j = 4$
$m[2,2] + m[3,4] + p_1 p_4 p_2$	$m[2,3] + m[4,4] + p_1 p_3 p_4$
$= 0 + 48 + 25(3)(1)$	$= 1200 + 0 + 25(1)(16)$
$= 123$	$= 1600$

$m[1,4]$:

$k = 1$	$k = 2$	$k = 3$
$i = 1$	$i = 1$	$i = 1$
$j = 4$	$j = 4$	$j = 4$
$= m[1,1] + m[2,4] + p_0 p_1 p_4$	$= m[1,2] + m[3,4] + p_0 p_2 p_4$	$= m[1,3] + m[4,4] + p_0 p_3 p_4$
$= 0 + 123 + 2(25)(1)$	$= 150 + 48 + 2(3)(1)$	$= 246 + 0 + 2(16)(1)$
$= 173$	$= 204$	$= 278$

Date:

$m[3,5]$ =

$i = 3$	$i = 3$
$j = 5$	$j = 5$
$k = 3$	$\boxed{k = 4}$
$= m[3,3] + m[4,5] + p_2 p_5 p_3$	$= m[3,4] + m[5,5] + p_2 p_5 p_4$
$= 0 + 80 + 3(5)16$	$= 48 + 0 + 3(5)(1)$
$= 320$	$= 63$

$m[2,5]$ =

$i = 2$	$i = 2$	$i = 2$
$j = 5$	$j = 5$	$j = 5$
$k = 2$	$k = 3$	$\boxed{k = 4}$
$= m[2,2] + m[3,5] + p_1 p_5 p_2$	$= m[2,3] + m[4,5] + p_1 p_5 p_3$	$= m[2,4] + m[5,5] + p_1 p_5 p_4$
$= 0 + 63 + 25(5)3 = 438$	$= 1200 + 80 + 25(5)16 = 3280$	$= 123 + 0 + 25(5)1 = 248$

Date:

m [1,5]

k = 1
i = 1
j = 5
= m[1,1] + m[2,5] + p0p1p5
= 0 + 248 + 2(5) 25
= 498

k = 2
i = 1
j = 5
= m[1,2] + m[3,5] + p0p2p5
= 150 + 63 + 2(5) 3
= 243

k = 3
i = 1
j = 5
= m[1,3] + m[4,5] + p0p3p5
246 + 80 + 2(5) 16
= 486

k = 4
i = 1
j = 5
= m[1,4] + m[5,5] p0p4p5
= 173 + 0 + 2(5) 1
= 183

k[i,j]	1	2	3	4	5
1	-	1	2	1	4
2	-	-	2	2	4
3	-	-	-	3	4
4	-	-	-	-	4
5	-	-	-	-	-

(A1 (A2 (A3 A4)))(A5)

(F) 0-1 knapstack problem

i	1	2	3	4	5
v_i	1	4	5	7	4
w_i	1	3	4	5	2

$w = 9$

v[i, w]	0	1	2	3	4	5	6	7	8	9
i = 0	0	0	0	0	0	0	0	0	0	0
1	0	1	1	1	1	1	1	1	1	1
2	0	1	1	4	5	5	5	5	5	5
3	0	1	1	4	5	6	6	9	10	10
4	0	1	1	4	5	7	8	9	11	12
5	0	1	4	5	5	8	9	11	12	13

max value = 13

keep table

keep	0	1	2	3	4	5	6	7	8	9
0	0	0	0	0	0	0	0	0	0	0
1	0	0	1	1	1	1	1	1	1	1
2	0	0	0	1	1	1	1	1	1	1
3	0	0	0	0	0	1	1	1	1	1
4	0	0	0	0	0	1	1	0	1	1
5	0	0	1	1	0	1	1	1	1	1

15/November/2023 Date:

taking

{ bil huz }

=> {2, 9, 12, 8, 21, 26}

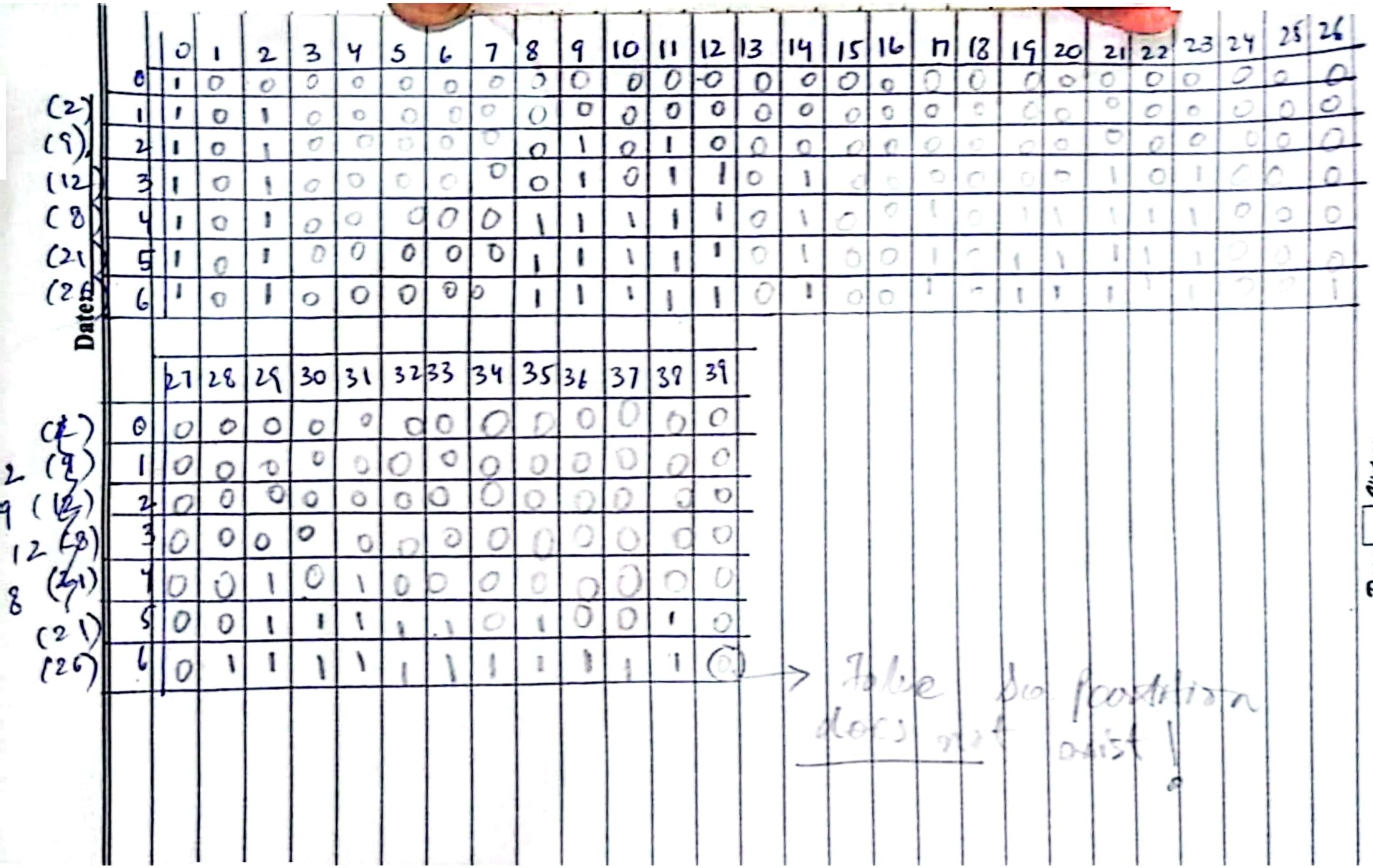
total sum = 78 is even so partition may exist.

26 21 8 12 9 2 0 26 21 8 7 2 1 0

25

0

Final output is 0 so
partition doesn't exist


Date:
Page
Victory
→ False position does not exist!

Date:

h) Rod cutting Problem.

L. {1, 2, 3, 4, 5, 6, 7, 8}

price. {1, 5, 8, 9, 10, 16, 18, 20} Rod L. 8

i	1	2	3	4	5	6	7	8
V	1	5	8	9	10	16	18	20

Length

Profit		0	1	2	3	4	5	6	7	8	
(1)	1	0	1	2	3	4	5	6.	7	8	
(5)	2	(0) ←	1 ←	5 ↑	6	10	11	15	16	20	*
(8)	3	0	1	5 ←	8 ←	10 ←	13 ←	16 ←	18 ←	21 ↑	**
(9)	4	0	1	5	8	10	13	16	18	21 ↑	
(10)	5	0	1	5	8	10	13	16	18	21 ↑	
(16)	6	0	1	5	8	10	13	16	18	21 ↑	
(18)	7	0	1	5	8	10	13	16	18	21 ↑	
(20)	8	0	1	5	8	10	13	16	18	21	

Max profit = 21

We will be placing 2 3 and one two or we will cut rod in 2 three pieces and one two pieces i.e maximum answer is 21

8 { 3 □ 8 ; 3 □ 8 ; 2 □ 5 }

21 ✓

day / date:

(i) $S = \{1, 5, 6, 8\}$ Change = 13

T	0	1	2	3	4	5	6	7	8	9	10	11	12	13
	0	∞	∞	∞	∞	∞	∞	∞	∞	∞	∞	∞	∞	∞
		1	2	3	4	5	2	5	2	5	3	3	3	3
i						1	1	1		2		2	2	2

T[change] = 2 → 2 coins needed (8, 5) (n, target)

i=1 (1-5, 1-6, 1-8 <=0)
1-1=0
r=0
min(∞, 1)
i=2 (2-5, 2-6, 2-8 <=0)
2-1=1
r(T[1]) = 1
min(∞, 2)

i=3: (3-5, 3-6, 3-8<=0
3-1=2
r= 2
min(∞, 3)
i=4
4-1=3 (4-5, 4-6, 4-8 <=0
r=3
min(∞, 4)

i=5:
5-1=4 | 5-5=0
r(4)=4 | r= 0
min(∞, 5) | min(0, 1)

i=6:
6-1=5
r(5)=1
min(∞, 2)
6-5=1
r(1)=1
min(2, 2)
6-6=0
r(0)=0
min(2, 1)

i=7
7-1=6
r(6)=1
min(∞, 2)
7-5=2
r(2)=2
min(2, 3)
7-6=1
r(1)=1
min(2, 2)

i=8
8-1=7
r(7)=2
min(∞, 3)
8-5=3
r(3)=3
min(3, 4)
8-6=2
r(2)=2
min(3, 3)
8-8=0
r(0)=0
min(3, 1)
i=9
9-1=8
r(8)=1
min(∞, 2)
9-5=4
r(4)=4
min(4, 5)
9-6=3
r(3)=3

9-8=1
r(1)=1
min(1, 2)
1=1:10:
10-1=9
r(9)=2
min(∞, 3)
10-5=5
r(5)=1
min(3, 2)
10-6=4
r(4)=4
min(2, 5)
10-8=2
r(2)=2
min(2, 3)
i=11:
11-1=10
r(10)=2
min(∞, 3)
11-5=6

11-6=5
r(5)=1
min(2, 4)
i=12:
12-1=11
r(11)=2
min(∞, 3)
12-5=7
r(7)=2
min(3, 3)
12-6=6
r(6)=1
min(3, 2)
12-8=4
r(4)=4
min(2, 5)

i=13:
13-1=12
r(12)=2
min(∞, 3)
13-5=8
r(8)=1
min(3, 2)
13-6=7
r(7)=2
min(2, 3)
13-8=5
r(5)=1
min(2, 2)

day / date:

(7) 5 = i, like, ice, cream, icecream, mobile, apple

u = ilikeapple

	0	1	2	3	4	5	6	7	8	9	10
		i	l	i	k	e	a	p	p	l	e
0		T	F	F	F	F	F	F	F	F	T → possible
i	1		F	F	F	T	F	F	F	F	T
l	2			T	F	F	F	F	F	F	F
i	3				F	F	F	F	F	F	F
k	4					F	F	F	F	F	F
e	5						F	F	F	F	T
a	6							F	F	F	F
p	7								F	F	F
p	8									F	F
l	9										F
e	10										

ilikeapple :

e → no

le → no

ple → no

pple → no

apple → Yes

e → no

ce → no

ice → no

like → yes

i → yes

w[5]

w[1] → w[1+1] = true

true possible

ilikeapple

1 2 3 4 5 6 7 8 9 10

w[2]

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