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CSE 2320
Homework 7 written part (50 points)

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P1. (15 points) Fill-out the edit distance table for the words **NONSTOP** and **ROUND**. An empty table is provided below. Fill-out however much you need.

	"	N	O	N	S	T	O	P	
"	0↖	1←	2←	3←	4←	5←	6←	7←	
R	1↑	1↖	2↖	3↖	4↖	5↖	6↖	7↖	
O	2↑	2↖	1↖	2←	3←	4←	5↖	6←	
U	3↑	3↖	2↖	2↖	3←	4←	5←	6←	
N	4↑	3↖	3↑	2↖	3←	4←	5←	6←	
D	5↑	4↖	4↖	3↑	3↖	4←	5←	6←	

P2. (10 points)

a) (4 points) Show the solution path on the table (bold, highlight or circle the cells). If two directions give the optimal cost, give preference in this order: diagonal, left, up

		a	s	t	e	r	n
	(0)↖	(1)←	2	3	4	5	6
s	1	1↖	(1)	2	3	4	5
t	2	2	2↖	(1)	2	3	4
r	3	3	3↑	2↖	(2)	2	3
e	4	4	4	3↑	2↖	(3)	3
n	5	5	5	4↑	3↑	3↖	(3)
g	6	6	6	5↑	4↑	4↖	4
t	7	7	7	6↑	5↑	(5)↖	5
h	8	8	8	7	6	6↖	(6)↖

b) In the table below the symbols indicate: \ - diagonal, ^ - up arrow, < - left arrow

		r	e	g	r	e	s	s	i	o	n
(↖)	(<)	<|	<|	<|	<|	<|	<|	<|	<|	<|
s	^|	(\)	|	|	|	|	|	|	<|	<|	<|
e	^|	|	(\)	<|	<|	|	<|	|	|	|	|
g	^|	|	^|	(\)	<|	<|	<|	<|	<|	<|
m	^|	|	^|	^|	(\)	|	|	|	|	|	|
e	^|	|	|	^|	|	(\)	(<)	(<)	(<)	<|	<|
n	^|	|	^|	^|	|	^|	|	|	|	(\)	|
t	^|	|	^|	^|	|	^|	|	|	|	|	(\)

b1) (2 points) Show in the symbols table the path you followed (e.g. bold, highlight, circle).

b2) (3 points) Show all 3 strings: the 2 strings that show the word alignments and the 3rd one showing the cost.

R E G R E S S I O N
1 0 0 1 0 1 1 1 1 1
S E G M E N T - - -

Distance = 7

R E G R E S S I O N
1 1 1 1 1 1 1 1 1 0 1
- - - - S E G M E N

Distance = 9

b3) (1 point) Using the 3rd string, what is the edit distance between these 2 strings?

Edit distance between 2 strings : 2

P3 (10 points) (Stair climbing with gain)

The jump sizes below have the given gain (e.g. health points). You can assume that any other jump size is allowed, but has 0 health points.

Jump size:	4	6	10	12
Gain (Health points):	10	21	33	36

a) (7 points) Fill out the solution array, sol, using bottom-up dynamic programming. Follow the style we did in class: for each work-out box (in rows for jump sizes 4,6,10,12) show the remaining stairs and the optimal value obtained by using that jump size Fill-out all the table (starting from 0).

	0	1	2	3	4	5	6	7	8	9	10	11	12
Sol:	0	0	0	0	10	10	21	21	21	21	33	33	42
Picked	-	-	-	-	4	4	6	6	6	6	10	10	6
4, 10	-	-	-	-	0,10	1,10	2,10	3,10	4,20	5,20	6,31	7,31	8,31
6, 21	-	-	-	-	-	-	0,21	1,21	2,21	3,21	4,31	5,31	6,42
10, 33	-	-	-	-	-	-	-	-	-	-	0,33	1,33	2,33
12, 36	-	-	-	-	-	-	-	-	-	-	-	-	0,36

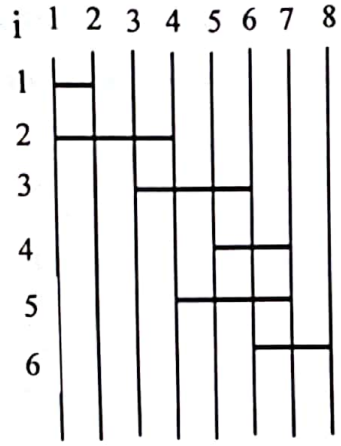
b) (3 points) Use the table above to recover the jumps that achieve the optimal value for 12 stairs.

For size 12, Remaining Weight = 12 − 6 = 6
For size 6, Remaining Weight = 6 − 6 = 0

Jumps that achieve optimal value for 12 stairs = 6,6
Total health points gained = 21 + 21 = 42

P3 (15 pts) Solve the Weighted Job Scheduling problem below. Recover the solution.
a) (10 pts) Use Dynamic Programming to solve the Weighted Job Scheduling below for jobs 1-6 with job values given by v_i.
b) (5 pts) Backtrack the solution (fill in in the rightmost column).

P3)



i	v_i	p_i	m(i)	m(i) used i: Y/N	In opt solution: Y/N
0	0	0	0	–	–
1	4	0	4	Yes	Yes
2	3	0	4	No	–
3	4	1	8	Yes	Yes
4	5	2	9	Yes	–
5	3	2	9	No	–
6	2	3	10	Yes	Yes

Maximum value picked : $10

Jobs picked : 6, 3, 1