Homework 7 written part (50 points)

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.

s e g m e - - - n t

r e g r e s s i o n

1 0 0 1 0 1 1 1 1 1

b3) (1 point) Using the 3rd string, what is the edit distance between these 2 strings? **7** (=1+0+0+1+0+1+1+1+1+1)

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.

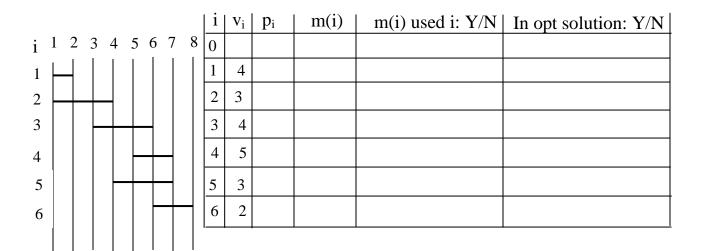| Jump size:	4	6	10	12
Gain (Health points):	10	21	33	36

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	-	-	-	-	A	A	B	B	B	B	C	C	B
4					0 10	1 10	2 10	3 10	4 20	5 20	6 31	7 31	8 31
6							0 21	1 21	2 21	3 21	4 31	5 31	6 42
10											0 33	1 33	2 33
12													0 36

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

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).

i	v_i	p_i	m(i)	m(i) used i: Y/N	In opt solution: Y/N
0					
1	4				
2	3				
3	4				
4	5				
5	3				
6	2				

i	V	p	m	Used	In Sol
0	0	-1			
1	4	0	4 (4,0)	Y	Y
2	3	0	4 (3,4)	N	
3	4	1	8 (8,4)	Y	Y
4	5	2	9 (9,8)	Y	
5	3	2	9 (**7**,9)	N	
6	2	3	10(10,9)	Y	Y

Solution: Value = 10, Jobs: 1, 3, 6