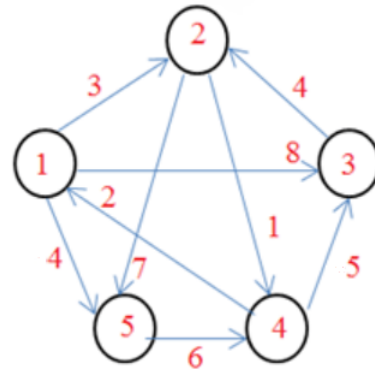


Exercises

We suggest you do these on your own. As with any homework problem, though, you may ask the TAs for help.

All solutions must include their writer's STUDENT ID.

1. In the given graph, what is the minimum cost to travel from vertex 1 to vertex 3?
(Using Floyd-Warshall Algorithm)



[We are expecting :
D(with all k possible) and P matrices]

2. In the given graph, find a hamiltonian cycle (a tour) of G with minimum cost.
(Using Traveling Salesman Algorithm)

Vertices	1	2	3	4
1	0	3	8	INF
2	2	0	6	4
3	INF	6	0	7
4	6	4	INF	0

3. Given n houses in a row, with integers denoting the cost of each house respectively. Each year you can sell the first or the last house in the row. However, the price of houses increases over time. Let the initial profits from the houses be $P_1, P_2, P_3 \dots P_n$. On the Y th year, the profit from the i th house will be $Y * P_i$.

Your task is to write pseudocode for finding the maximum profit of selling all the houses over years.

(Attention: your algorithm must be dynamic programming with either top-down or bottom-up approach; any other algorithm is not acceptable.)

Example:

Input: [2, 4, 6, 2, 5]

Output: 64

Explanation:

initial year $Y = 1$

first selling: $2 * Y = 2 * 1 = 2, Y++$

second selling: $5 * Y = 5 * 2 = 10, Y++$

third selling: $2 * Y = 2 * 3 = 6, Y++$

forth selling: $4 * Y = 4 * 4 = 16, Y++$

fifth selling: $6 * Y = 6 * 5 = 30, Y++$

Summation = $30 + 16 + 6 + 10 + 2 = 64$

4. Subsequent has alpha property if and only if all elements of subsequence are alternating.

What does this mean? If a sequence $\{x_1, x_2, \dots, x_n\}$ is alternating sequence then its element satisfy one of the following relation:

- a. $x_1 < x_2 > x_3 < x_4 > x_5 < \dots x_n$
- b. $x_1 > x_2 < x_3 > x_4 < x_5 > \dots x_n$

Your task is to write pseudo code for finding the longest subsequence which has alpha property. (Attention: your algorithm must be dynamic programming with either top-down or bottom-up approach; any other algorithm is not acceptable.)

Let's look at an example for clarity.

Examples:

input: $\{1, 5, 4\}$

The whole arrays is of the form $x_1 < x_2 > x_3$

So output is: 3

input: $\{10, 22, 9, 33, 49, 50, 31, 60\}$

The subsequences $\{10, 22, 9, 33, 31, 60\}$ or

$\{10, 22, 9, 49, 31, 60\}$ or $\{10, 22, 9, 50, 31, 60\}$

are the longest which have an alpha property and the maximum length of them is 6.

Output: 6

Input: $\{1, 4, 5\}$

All subsequences of length 2 are either of the form $x_1 < x_2$; or $x_1 > x_2$.

Output: 2

5. Find the shortest path from vertex 1 to vertex 6 using **Dijkstra** algorithm and **Bellman Ford** . Under what circumstances is Bellman Ford better than Dijkstra ?

