

Name: _____ Wisc id: _____

Robber

1. You are a robber that plans to rob n houses along a street. Each house stashes some amount of money $v_i > 0$. However, you cannot rob two adjacent houses since this will alert the police. What is the maximum amount of money you can rob without alerting the police?

Solution:

2. What if the houses are arranged in a circle?

Solution:

Convex Polygon Triangulation

3. You have a convex n -sided polygon where each vertex has an integer value.

You will triangulate the polygon into $n - 2$ triangles. For each triangle, the value of that triangle is the product of the values of its vertices, and the total score of the triangulation is the sum of these values over all $n - 2$ triangles in the triangulation.

Return the smallest possible total score that you can achieve with some triangulation of the polygon.

Solution:

Sweet Tapas

4. Bucky Badger is having dinner at an upscale tapas bar, where he will order many small plates. There are N plates of food on the menu, where information for plate i is given by a triple of non-negative integers (v_i, c_i, s_i) : the plate's volume v_i , calories c_i , and sweetness $s_i \in \{0, 1\}$ (the plate is sweet if $s_i = 1$ and not sweet if $s_i = 0$). Bucky is on a **diet**: he wants to eat no more than C calories during his meal, but wants to fill his stomach as much as possible. He also wants to order exactly $S < N$ sweet plates, without purchasing the same dish twice.

Describe an $O(NCS)$ -time algorithm to find the maximum volume of food Bucky can eat given his diet.

Solution:

LIS

5. Given an integer array, return the length of the longest strictly increasing subsequence. Can you come up with a $O(n \log n)$ solution?

Solution: