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Homework 1

CS 6515: Introduction to Graduate Algorithms

1.) Define the entries of your table in words. E.g., $T(i)$ or $T(i, j)$ is ...

Let $T(i)$ = the maximum total profit that can be achieved at i -th house (p_i) from inputs p_1, p_2, \dots, p_n .

2.) State a recurrence for the entries of your table in terms of smaller subproblems.

Base Case(s): $T(0) = 0, T(1) = p[1]$

Recurrence: $T(i) = \max\{T(i-1), T(i-2) + p[i]\}$, where $1 < i \leq n$

3.) Write pseudocode for your algorithm to solve this problem.

$T(0) = 0$

$T(1) = p[1]$

for $i = 2$ to n do

$T(i) = \max\{T(i-1), T(i-2) + p[i]\}$

return $\max\{T(\cdot)\}$

4.) State and analyze the running time of your algorithm.

We have one for-loop and \max function that establishes values for T (both are $O(n)$), and the maximum value for T is returned at the end ($O(n)$). The overall runtime is $O(n)$.

References:

- <https://www.geeksforgeeks.org/maximum-sum-such-that-no-two-elements-are-adjacent/#>

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