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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 (*pi*) from inputs *p*1, *p*2,…,*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* < *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(.)}

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/#](https://www.geeksforgeeks.org/maximum-sum-such-that-no-two-elements-are-adjacent/)

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