

You are going on a long trip. You start on the road at mile post 0. Along the way there are  $n$  hotels, at mile posts  $a_1 < a_2 < \dots < a_n$ , where each  $a_i$  is measured from the starting point. The only places you are allowed to stop are at these hotels, but you can choose which of the hotels you stop at. You must stop at the  $n$ -th hotel (at distance  $a_n$ ), which is your destination.

You'd ideally like to travel 200 miles a day, but this may not be possible (depending on the spacing of the hotels). If you travel  $x$  miles during a day, the penalty for that day is  $(200-x)^2$ . You want to plan your trip so as to minimize the total penalty, that is, the sum, over all travel days, of the daily penalties.

Give an efficient algorithm that determines the optimal sequence of hotels at which to stop.

A subsequence is palindromic if it is the same whether read left to right or right to left. For instance, the sequence

A C G T G T C A A A A T C G

has many palindromic subsequences, including A C G C A and A A A A. On the other hand, the subsequence A C T is not palindromic. Devise an algorithm that takes a sequence  $x[1 \dots n]$  and returns the (length of the) longest palindromic subsequence. Its running time should be  $O(n^2)$ .