ASSIGNMENT4 QUESTION3

3. You are on vacation for N days at a resort that has three possible activities. For each day, for each activity, you've determined how much enjoyment you will get out of that activity if you do it on that particular day (the same

1

activity might give you a different amount at different days). However, you are not allowed to do the same activity two days in a row. What is the maximum total enjoyment possible? (30 pts)

Answer:

For each day $i \leq N$ and have three possible activities a_j to do. J = 1, 2 ,3 .

Let $P(i,j)$ represent the maximum enjoyment up to day i and do activity j on day i.

Let $enjoyment(i,j)$ represent the enjoyment do activity j on day i.

Solve the subproblems in the order P(1, J), . . . , P(N, J). For j = 1, 2, 3

For all $i \leq N$ we have:

$P(i,j) = enjoyment(i,j) + \max\big(P(i-1,k), P(i-1,k)\big)$ $K = 1, 2, 3$ $but\ not\ equal\ to\ j$

And we have Base case:

$P(0,j) = 0\ for\ j = 1, 2, 3$

$P(1,j) = enjoyment(1,j)\ for\ j = 1, 2, 3$

The final solution will be given by $\max(P(N,1), P(N,2), P(N,3))$

The time complexity for this solution will be $O(3N) = O(N)$ since we will compute for each activity for N days.