Q3

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Answer:

Let three activities be a_1, a_2 and a_3, and let the enjoyment of each activity on day i are $e(i,1), e(i,2)$ and $e(i,3)$. Then we can simply solve the following subproblem:

What is the maximum enjoyment in total (TE) up to day i.

The base cases are:

$$TE(0,1) = e(0,1)$$
$$TE(0,2) = e(0,2)$$
$$TE(0,3) = e(0,3)$$

We solve the following recursions:

$$TE(i,1) = max\begin{cases} TE(i-1,2) + e(i,1) \\ TE(i-1,3) + e(i,1) \end{cases}$$

$$TE(i,2) = max\begin{cases} TE(i-1,1) + e(i,2) \\ TE(i-1,3) + e(i,2) \end{cases}$$

$$TE(i,3) = max\begin{cases} TE(i-1,1) + e(i,3) \\ TE(i-1,2) + e(i,3) \end{cases}$$

Hence, the maximum total enjoyment for day N will be

$$MAX\{TE(N,1), TE(N,2), TE(N,3)\}$$