Problem type 1:

Write the recurrence that describes the following problem. The recurrence is the piece-wise function that describes the calculation of the solution desired by the below problem. We *do not* want pseudocode.

> *(See variants below)*

a. **BYA & BYH**

   Given an array $A[1..n]$ of integers, compute the length of a *longest alternating subsequence*. A sequence $B[1..\ell]$ is *alternating* if $B[i] < B[i-1]$ for every even index $i \geq 2$, and $B[i] > B[i-1]$ for every odd index $i \geq 3$.

   Let $LAS^+(i, j)$ denote the length of the longest alternating subsequence of $A[i..n]$ whose first element (if any) is larger than $A[j]$ and whose second element (if any) is smaller than its first. Let $LAS^-(i, j)$ denote the length of the longest alternating subsequence of $A[i..n]$ whose first element (if any) is smaller than $A[j]$ and whose second element (if any) is larger than its first.

b. **BYC & BYE**

   Given an array $A[1..n]$ of integers, compute the length of a *longest decreasing subsequence*.

   Let $LDS(i, j)$ denote the length of the longest decreasing subsequence of $A[i..n]$ where every element is smaller than $A[j]$.

c. **BYD & BYG**

   Given an array $A[1..n]$, compute the length of a longest *palindrome* subsequence of A. Recall that a sequence $B[1..\ell]$ is a *palindrome* if $B[i] = B[\ell - i + 1]$ for every index i.

   Let $LPS(i, j)$ denote the length of the longest palindrome subsequence of $A[i..j]$.

d. **BYB & BYF**

   Given an array $A[1..n]$ of integers, compute the length of a longest *convex* subsequence of A. A sequence $B[1..\ell]$ is *convex* if $B[i] - B[i-1] > B[i-1] - B[i-2]$ for every index $i \geq 3$.

   Let $LCS(i, j)$ denote the length of the longest convex subsequence of $A[i..n]$ whose first two elements are $A[i]$ and $A[j]$.