A palindrome is a string that reads the same from the left and from the right. For example, REDDER, I, ROTATOR, MOM, are palindrome. From a non-palindrome string, you can always remove an arbitrary number of characters from it to make it a palindrome. For example, from both ADAM and ADMA, you can remove 'M' to obtain a palindrome, ADA. In both cases, we say that ADA is the longest palindrome subsequence in the original strings, ADAM and ADMA.

We would like to derice a dynamic programming algorithm to determine the length of the longest palindrome subsequence in a string. You are given the string S of length n in the form of a character array S=s[], where s[i] is the i-th character in the string, $1 \leq i \leq n$.

(a) As the first step, please complete the following equation to represent the length of the longest palindrome subsequence in the given string S by filtering out the blanks. L(i, j) represents the length of the longest palindrome subsequence in s[i..j], a substring S that starts from the i-th character and ends at the j-th character of S.

$L(i, j)$ is defined for $1 \leq i \leq n.$, $1 \leq j \leq n$, $j \leq i-1$, and

$$L(i,j) = \begin{cases} \_\_\_(1)\_\_\_ & \text{,if } i = j+1 \\ \_\_\_(2)\_\_\_ & \text{,if } i = j \\ \_\_\_(3)\_\_\_ & \text{,if } i < j \text{ and } s[i] == s[j] \\ \_\_\_(4)\_\_\_ & \text{,if otherwise} \end{cases}$$

(b) Calculate the length of the longest palindrome sequence in the string CABDAACBADFA

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Ans.

(a)

$$L(i,j)=\begin{cases}0 & \text{, if } i=j+1\\ 1 & \text{, if } i==j\\ L(i+1,j-1)+2 & \text{, if } i<j \text{ and } s[i]==s[j]\\ Max(L(i+1,j),L(i,j-1)) & \text{, otherwise}\end{cases}$$

(b)

嘗試用湊的

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計算表格時間

=) 表格

		C	A	B	D	A	A	C	B	A	D	F	A
	i	1	2	3	4	5	6	7	8	9	10	11	12
C	1	1	0										
A	2	1	1	0									
B	3	1	1	1	0								
D	4	1	1	1	1	0							
A	5	1	3	1	1	1	0						
A	6	1	3	2	2	2	1	0					
C	7	1	3	2	2	2	1	1	0				
B	8	1	4	4	2	2	1	1	1	0			
A	9	1	6	4	3	3	1	1	1	1	0		
D	10	1	6	5	5	1	1	1	1	1	1	0	
F	11	1	6	5	5	1	1	1	1	1	1	1	0
A	12	1	(7)	5	5	3	3	3	3	3	1	1	1