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Minimum number of palindromic subsequences to be removed to empty a binary string

Given a binary string, count minimum number of subsequences to be removed to make it an empty string.

Examples:

```
Input: str[] = "10001"
Output: 1
Since the whole string is palindrome,
we need only one removal.

Input: str[] = "10001001"
Output: 2
We can remove the middle 1 as first
removal, after first removal string
becomes 1000001 which is a palindrome.
```

Expected time complexity : O(n)

We strongly recommend that you click here and practice it, before moving on to the solution.

The problem is simple and can be solved easily using below two facts.

1) If given string is palindrome, we need only one removal.

2) Else we need two removals. Note that every binary string has all 1's as a subsequence and all 0's as another subsequence. We can remove any of the two subsequences to get a unary string. A unary string is always palindrome.

```cpp
// C++ program to count minimum palindromic subsequences
// to be removed to make an string empty.
#include <bits/stdc++.h>
using namespace std;

// A function to check if a string str is palindrome
bool isPalindrome(const char *str)
{
    // Start from leftmost and rightmost corners of str
    int l = 0;
    int h = strlen(str) - 1;

    // Keep comparing characters while they are same
```

```cpp
        while (h > l)
            if (str[l++] != str[h--])
                return false;

    return true;
}

// Returns count of minimum palindromic subseuqnces to
// be removed to make string empty
int minRemovals(const char *str)
{
    // If string is empty
    if (str[0] == '\0')
        return 0;

    // If string is palindrome
    if (isPalindrome(str))
        return 1;

    // If string is not palindrome
    return 2;
}

// Driver code to test above
int main()
{
    cout << minRemovals("010010") << endl;
    cout << minRemovals("0100101") << endl;
    return 0;
}
```

Run on IDE

Output :

```
1
2
```

Exercises:

1. Extend the above solution to count minimum number of subsequences to be removed to make it an empty string.
2. What is the maximum count for ternary strings

This problem and solution are contributed by **Hardik Gulati**. Please write comments if you find anything incorrect, or you want to share more information about the topic discussed above

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