Q. Longest palindrome

Q1 For every index i find the length of the longest palindrome centered around i.
Ex: a r a r a b a c a d a b r a c a d a b r a

1. a r a r a b a c a d a b r a c a d a b r a

2. 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

```
f(i:0 ⟶ n-1) {
    j=0
    while( i-j<n && i+j<n && s[i-j]==s[i+j]
        j++
    z[i]=j
}
```

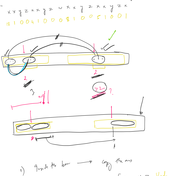
TC: O(N²)

a a a a a a a a

TC: O(N²)

2. a r a r a b a c a d a b r a c a d a b r a

Z: 1 0 0 1 0 0 0 0 1 0 0 0 1 0 0 1 0 0 1



1) Inside A ⟶ copy data
2) Outside ⟶ 0 [Manually compute]
3) Beyond ⟶ 0 [Manually compute]

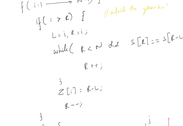
"the plus"

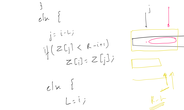
0 L R

S: a r a r a b a c a d a b r a c a d a b r a

Z: 1 0 0 1 0 1 0 0 1 0 0 1 0 0 1 0

```
L=0, R=0;
N = s.length();
Z[0]=N;
f(i ⟶ n-1) {
    if(i > R) {
        L=i, R=i;
        while( R<N && s[R]==s[R-L]) {
            R++;
        }
        Z[i]= R-L;
        R--;
    }
    else {
        j=i-L;
        if(Z[j] < R-i+1)
            Z[i]=Z[j];
        else {
            L=i;
            while(R<N && s[R]==s[R-L])
                R++;
            Z[i]=R-L;
            R--;
        }
    }
}
```





TC: O(N)

Q. Given a string A and a string B. Find if B is a substring of A.

N+M

A: "computer" N

B: "mra" M

T: B+'$'+A ⟶ (N+M)

P: ?

T: mra $ computer

Z: 1 2 0 0 0 0 3 0 0 0 0 0 2 0 0

TC: O(N+M)

Q. P, T.
occ of P in T ⇒ substring.

P: ana

T: "abnanaanabana"

A: P+'$'+T

= ana $ abnanaanabana

0 1 0 1 0 0 3 0 3 0 1 0 3 0 1

TC: O(N+M)
SC: O(N+M)

Q. Given a string. Find the smallest period of that string!

abca abca abca ⟶ 4

abab abab ⟶ 2

abcd abcd abcd abcd a

0 1 2 3 0 1 2 3 0 1 2 3 0 1 2 3 0

Z: 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

N/A = 2.0

N = 15

1, 3, 5, 15

16

1, 2, 3, 5, 15

N

N

N√N

a a a a a a a a a a a a a a a

Q. Given a binary string B.
Find the max of cyclic permutation of B
Set B A cyclic permutation = 0

B: "0101"

1101

1110

0111

N/A = 2.0

0 1010 ⟶ 2

0101

1010

0101

1010 1010

0101

T

abcde abcde

O(N)

P+'$'+T

Z: