Complexity Analysis

* for(i=1, j=n; i<=j ; i++, j--){ $\longrightarrow \frac{n}{2}+2$

if(a[i] != a[j]){ $\longrightarrow n-j+1$

print (Not Palindrome); $\longrightarrow 1$

break; $\longrightarrow 1$

}

}

$$c_1\left(\frac{n}{2}+2\right) + c_2(n-j+1) + c_3 + c_4$$

$$= \frac{c_1 n + 2c_1 + 2c_2 n - 2c_2 j + 2c_2 + 2c_3 + 2c_4}{2}$$

$$= \frac{n(c_1+2c_2) - 2c_2 j + 2(c_1+c_2+c_3+c_4)}{2}$$

$$= \frac{nc_5 - 2c_2 j + 2c_6}{2}$$

$$\therefore y \propto \frac{n}{2}$$

* for (i = n ; i>0 ; i /= 2) { $\longrightarrow \log_2 n + 2$

print (i) ; $\longrightarrow \log_2 n + 1$

}

$n=1 ; \rightarrow 1 \rightarrow 2^0 + 1$

$n=2 \rightarrow 2 \rightarrow 2^1 +$

$n=3 \rightarrow 3$

$n=4 \rightarrow 3$

$n=5 \rightarrow 3$

$n=8 \rightarrow 4$

$n=15 \rightarrow 4$

$n=16 \rightarrow 5$

$\log_2 n + 1$

$\therefore y \propto \log_2 n$

* for (i=1, i <= n-1 ; i++) { $\rightarrow n$

for(j=1 ; j< n-i-1 ; j++){ $\longrightarrow \frac{n(n-1)}{2}$

print (j) ; $\frac{(n-1)(n-2)}{2}$

}

}

$$c_1 n + c_2 \frac{n^2-n}{2} + c_m \frac{n^2-3n+2}{2}$$

$$= \frac{2c_1 n + c_2 n^2 - c_2 n + c_3 n^2 - 3c_3 n + 2c_m}{2}$$

$$= \frac{n^2(c_2+c_m) + n(2c_1 + c_2 - 3c_m) + 2c_m}{2}$$

$$= \frac{n^2 c_4 + n c_5 + 2c_m}{2}$$

$\therefore y \propto n^2$

```
for(i=1 ;  i<=n;  i++){
      for (j=i+1 ; j<=n ; j++){
            for(k=j+1; k<=n; k++){
                  print(k);
            }
      }
}
```

$\text{for}(i=1;\ i<=n;\ i++)\{ \longrightarrow n+1$

$\sum_{i=1}^{N} \frac{i(i-1)}{2}$

$\text{for}(j=i+1;\ j<=n;\ j++)\{ \longrightarrow \cancel{n(n-1)} \quad \frac{n(n-1)}{2}$

$\text{for}(k=j+1;\ k<=n;\ k++)\{ \longrightarrow \cancel{\sum} \quad n-3$

$\frac{n(n-1)}{2}$

$\sum_{j=1}^{n} j^2 - j$

$\frac{n^2-n}{2}$

$= \left\{ \frac{n(n+1)(2n+1)}{6} - \frac{n(n+1)}{2} \right\}$

$= \frac{2n^3+3n^2+n-3n^2-3n}{6}$

$= \frac{2n^3-2n}{6}$

$\frac{n^3-n}{3}$

$\therefore O(n^3)$

$\sum_{i=1}^{N-1} \sum_{j=i+1}^{N}$

$\frac{(N-2)(N-1)}{6}$

n^2+n

$= \frac{1}{2}\left[\frac{n(n+1)(2n+1)}{6} - 3\frac{n(n+1)}{2} \right]$

$= \frac{1}{2}\left\{ \frac{2n^3+n^2+2n^2+n-9n^2-9n}{6} \right\}$

$= \frac{2n^3-3n^2-4n}{6}$

$n\frac{(n^2-3n-4)}{6}$

$\frac{n^2-4n+n-4}{6}$

$= n\frac{(n-4)(n+1)}{6}$

$2 \to n$

$-1+0+1$

$n-1$

$\frac{(n-2)(n-2+1)}{2}$

$\frac{(n-1)(n-1+1)}{2}$

$= \frac{n(n-1)}{2}$

$\frac{n(n-1)}{2} - n$

$= \frac{n^2-n-2n}{2}$

$= \frac{n^2-3n}{2}$

* Array deletion:

m P 5

$n-p+1$ $n-\text{position}$

```
for( i = position ; i <= n-1 ; i++ ){
    arr[i] = arr[i+1];   -> n-p
}
```

1
2
3
4
5

$i=3 \rightarrow 2$
$i=2 \rightarrow 3$
$i=1 \rightarrow 4$

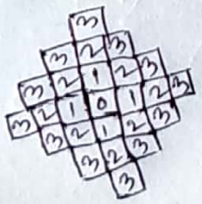
$$c_1 n - c_1 p + c_1 + c_2 n - c_2 p$$

$$= n(c_1 + c_2) - p(c_1 + c_2) + c_1$$

$$= n c_3 - p c_4 + c_1$$

$$y \propto n$$

*



$$1+4+8+12+16+\dots$$

$$= 1+4(1+2+3+4+\dots+(n-1))$$

$$= 1+4\,\frac{n(n-1)}{2}$$

$$= 1+2n(n-1)$$

for total, $2n(n-1)+1$ for $n = 92312$

total $= 2 \times 92312(92311)+1$

$= 17042826065$

**

If we know gcd of two numbers, we can easily calculate lcm of these numbers. This process is,

$$LCM = \frac{\text{Multiplication of the numbers}}{\text{their GCD}}$$