

## DP Solutions

### Solution 1:

Time Complexity :  $O(n)$

Space Complexity:  $O(n)$

```
import java.io.*;
```

```
class Solution {
```

```
    static void printTrib(int n){  
        int dp[]=new int[n];  
        dp[0] = dp[1] = 0;  
        dp[2] = 1;  
  
        for (int i = 3; i < n; i++)  
            dp[i] = dp[i - 1] + dp[i - 2] + dp[i - 3];  
  
        for (int i = 0; i < n; i++)  
            System.out.print(dp[i] + " ");  
    }
```

```
    public static void main(String args[]){  
        int n = 10;  
        printTrib(n);  
    }  
}
```

### Solution 2 :

Time Complexity :  $O(n)$

Space Complexity:  $O(n)$

```
import java.io.*;
```

```
class Solution{
```

```
static void _printParenthesis(char str[], int pos, int n, int open, int close) {
    if(close == n) {
        for(int i=0;i<str.length;i++)
            System.out.print(str[i]);
        System.out.println();
        return;
    }
    else{
        if(open > close) {
            str[pos] = '}';
            _printParenthesis(str, pos+1, n, open, close+1);
        }
        if(open < n) {
            str[pos] = '{';
            _printParenthesis(str, pos+1, n, open+1, close);
        }
    }
}

static void printParenthesis(char str[], int n) {
    if(n > 0)
        _printParenthesis(str, 0, n, 0, 0);
    return;
}

public static void main (String[] args) {
    int n = 3;
    char[] str = new char[2 * n];
    printParenthesis(str, n);
}
}
```

### Solution 3 :

Time Complexity :  $O(n^2)$

Space Complexity:  $O(1)$

```
import java.util.*;
```

```
class Solution{

static int max_profit(int a[],int b[],int n,int fee){
int i, j, profit;
int l, r, diff_day = 1, sum = 0;

    b[0]=0;
    b[1]=diff_day;
for(i=1;i<n;i++){
    l=0;
    r=diff_day;
    sum=0;

    for(j=n-1;j>=i;j--){
        profit=(a[r]-a[l])-fee;
        if(profit>0){
            sum=sum+profit;
        }
        l++;
        r++;
    }

    if(b[0] < sum){
        b[0] = sum;
        b[1] = diff_day;
    }
    diff_day++;
}
return 0;
}

public static void main(String args[]){
    int arr[] = { 6, 1, 7, 2, 8, 4 };
    int n = arr.length;
    int[] b = new int[2];
    int tranFee = 2;

    max_profit(arr, b, n, tranFee);
    System.out.println(b[0]+" "+b[1]);
}
```

```
}
```

#### Solution 4 :

Time Complexity :  $O(n^2)$

Space Complexity:  $O(n^2)$

```
import java.util.*;
```

```
class Solution {
```

```
    static int LIP(int dp[][], int mat[], int n,
                  int m, int x, int y){
        if (dp[x][y] < 0) {
            int result = 0;
            if (x == n - 1 && y == m - 1)
                return dp[x][y] = 1;
            if (x == n - 1 || y == m - 1)
                result = 1;
            if (x + 1 < n && mat[x][y] < mat[x + 1][y])
                result = 1 + LIP(dp, mat, n, m, x + 1, y);
            if (y + 1 < m && mat[x][y] < mat[x][y + 1])
                result = Math.max(result, 1 + LIP(dp, mat, n, m, x, y + 1));
            dp[x][y] = result;
        }
        return dp[x][y];
    }
}
```

```
static int wrapper(int mat[], int n, int m){
    int dp[][] = new int[10][10];
    for (int i = 0; i < 10; i++)
        Arrays.fill(dp[i], -1);

    return LIP(dp, mat, n, m, 0, 0);
}
```

```
public static void main(String[] args){
    int mat[] = {
```

```
        { 1, 2, 3, 4 },
        { 2, 2, 3, 4 },
        { 3, 2, 3, 4 },
        { 4, 5, 6, 7 },
    };

    int n = 4, m = 4;
    System.out.println(wrapper(mat, n, m));
}
}
```

Solution 5 :

```
public static int helper(int left, int right) {
    if (left == 0 && right == 0){
        ans++;
    }
    if (left > right){
        return 0;
    }

    if (left > 0){
        helper(left-1, right);
    }
    if (right > 0){
        helper(left, right-1);
    }
    return ans;
}

// Find possible ways for balanced parentheses
private static int countWays(int n){
    // If n is odd no possible valid parentheses
    if ((n & 1) != 0)
        return 0;
    return helper(n / 2, n / 2);
}
```