Assignment Questions 9

Question 1

Given an integer `n`, return *`true` if it is a power of two. Otherwise, return `false`.*

An integer `n` is a power of two, if there exists an integer `x` such that `n == 2x`.

Example 1: Input: n = 1

Output: true

Example 2: Input: n = 16

Output: true

Example 3: Input: n = 3

Output: false

Solution:-

```
class Solution {
    public boolean isPowerOfTwo(int n) {
     if (((n<=0)) || (Integer.lowestOneBit(n) != n)) {
         return false;
         }
        else {
         return true;
        }
    }
}
```

Question 2

Given a number n, find the sum of the first natural numbers.

Example 1:

Input: n = 3

Output: 6

Example 2:

Input : 5

Output : 15

Solution:-

```
import java.io.*;

class Test{

    // Returns sum of first n natural
    // numbers
    static int findSum(int n)
    {
        int sum = 0;
        for (int x = 1; x <= n; x++)
            sum = sum + x;
        return sum;
    }

    public static void main(String args[])
    {
        int n = 5;
        System.out.println(findSum(n));
    }
}
```

Question 3

Given a positive integer, N. Find the factorial of N.

Example 1:

Input: N = 5

Output: 120

Example 2:

Input: N = 4

Output: 24

Solution:-

```
class Test {
    static int factorial(int n)
    {
```

```
        if (n == 0)
            return 1;

        return n * factorial(n - 1);
    }

    // Driver method
    public static void main(String[] args)
    {
        int num = 5;
        System.out.println("Factorial of " + num
                           + " is " + factorial(5));
    }
}
```

Question 4

Given a number N and a power P, the task is to find the exponent of this number raised to the given power, i.e. N^P.

Example 1 :

Input: N = 5, P = 2

Output: 25

Example 2 : Input: N = 2, P = 5

Output: 32

Solution:-

```
class Test {



    static int power(int N, int P)
    {
        int pow = 1;
        for (int i = 1; i <= P; i++)
            pow *= N;
```

```
        return pow;
    }
    public static void main(String[] args)
    {
        int N = 2;
        int P = 3;

        System.out.println(power(N, P));
    }
}
```

Question 5

Given an array of integers **arr**, the task is to find maximum element of that array using recursion.

Example 1:

Input: arr = {1, 4, 3, -5, -4, 8, 6}; Output: 8

Example 2:

Input: arr = {1, 4, 45, 6, 10, -8}; Output: 45

Solution:-

```
import java.util.*;

class Solution {

    public static int findMaxRec(int A[], int n)
    {
    if(n == 1)
```

```
        return A[0];


        return Math.max(A[n-1], findMaxRec(A, n-1));
    }
    public static void main(String args[])
    {
        int A[] = {1, 4, 45, 6, -50, 10, 2};
        int n = A.length;
        System.out.println(findMaxRec(A, n));
    }
}
```

Question 6

Given first term (a), common difference (d) and a integer N of the Arithmetic Progression series, the task is to find Nth term of the series.

Example 1:

Input : a = 2 d = 1 N = 5 Output : 6 The 5th term of the series is : 6

Example 2:

Input : a = 5 d = 2 N = 10 Output : 23 The 10th term of the series is : 23

Solution:-

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


class Test
{
```

```
    public static int Nth_of_AP(int a, int d,int N)
    {
        // using formula to find the Nth
        // term t(n) = a(1) + (n-1)*d
        return ( a + (N - 1) * d );
    }
    public static void main(String[] args)
    {
        // starting number
        int a = 2;
        // Common difference
        int d = 1;
        // N th term to be find
        int N = 5;
        // Display the output
        System.out.print("The "+ N +"th term of the series is : " +Nth_of_AP(a, d, N));
    }
}
```

Question 7

Given a string S, the task is to write a program to print all permutations of a given string.

Example 1:

Input:

S = "ABC"

Output:

"ABC", "ACB", "BAC", "BCA", "CBA", "CAB"

Example 2:

Input:

S = "XY"

Output:

"XY", "YX"

Solution:-

```
import java.util.*;

class Test {

	static void permute(String s, String answer)
	{
		if (s.length() == 0) {
			System.out.print(answer + " ");
			return;
		}

		for (int i = 0; i < s.length(); i++) {
			char ch = s.charAt(i);
			String left_substr = s.substring(0, i);
			String right_substr = s.substring(i + 1);
			String rest = left_substr + right_substr;
```

```
                permute(rest, answer + ch);
            }
        }
        public static void main(String args[])
        {
            Scanner scan = new Scanner(System.in);

            String s = "ABC";
            String answer = "";

            System.out.print("\nAll possible strings are : ");
            permute(s, answer);
        }
}
```

Question 8

Given an array, find a product of all array elements.

Example 1:

Input : arr[] = {1, 2, 3, 4, 5} Output : 120 **Example 2:**

Input : arr[] = {1, 6, 3} Output : 18

Solution:-

```
class ProductArray {
        void productArray(int arr[], int n)
{
            if (n == 1) {
                System.out.print("0");
```

```
            return;
        }
        int i, temp = 1;
        int prod[] = new int[n];
        for (int j = 0; j < n; j++)
            prod[j] = 1;
        for (i = 0; i < n; i++) {
            prod[i] = temp;
            temp *= arr[i];
        }
        temp = 1;
        for (i = n - 1; i >= 0; i--) {
            prod[i] *= temp;
            temp *= arr[i];
        }
        for (i = 0; i < n; i++)
            System.out.print(prod[i] + " ");
        return;
}

public static void main(String[] args)
{
        ProductArray pa = new ProductArray();
```

```
        int arr[] = { 10, 3, 5, 6, 2 };
        int n = arr.length;
        System.out.println("The product array is : ");
        pa.productArray(arr, n);
    }
}
```