Answer 1)

```
// Online Java Compiler
// Use this editor to write, compile and run your Java code online

public class HelloWorld {
    public static boolean isPowerOfTwo(int n) {
        if (n == 1) {
            return true;
        } else if (n % 2 != 0 || n == 0) {
            return false;
        } else {
            return isPowerOfTwo(n / 2);
        }
    }

    public static void main(String[] args) {
        int n1 = 1;
        System.out.println(n1 + " is a power of two: " + isPowerOfTwo(n1));

        int n2 = 16;
        System.out.println(n2 + " is a power of two: " + isPowerOfTwo(n2));

        int n3 = 3;
        System.out.println(n3 + " is a power of two: " + isPowerOfTwo(n3));
    }
}
```

Answer 2)

```
// Online Java Compiler
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public class HelloWorld {
    public static int calculateSum(int n) {
        if (n == 1) {
            return 1;
        } else {
            return n + calculateSum(n - 1);
        }
    }
```

```
    public static void main(String[] args) {
        int n1 = 3;
        System.out.println("Sum of the first " + n1 + " natural numbers: " + calculateSum(n1));

        int n2 = 5;
        System.out.println("Sum of the first " + n2 + " natural numbers: " + calculateSum(n2));
    }
}
```

Answer 3)

```
// Online Java Compiler
// Use this editor to write, compile and run your Java code online

public class HelloWorld {
    public static int calculateFactorial(int n) {
        if (n == 0 || n == 1) {
            return 1;
        } else {
            return n * calculateFactorial(n - 1);
        }
    }

    public static void main(String[] args) {
        int n1 = 5;
        System.out.println("Factorial of " + n1 + ": " + calculateFactorial(n1));

        int n2 = 4;
        System.out.println("Factorial of " + n2 + ": " + calculateFactorial(n2));
    }
}
```

Answer 4)

```
public class HelloWorld {
    public static long calculateExponent(int N, int P) {
        if (P == 0) {
            return 1;
        } else {
            return N * calculateExponent(N, P - 1);
```

```
        }
    }

    public static void main(String[] args) {
        int N1 = 5;
        int P1 = 2;
        System.out.println(N1 + " raised to the power " + P1 + ": " + calculateExponent(N1, P1));

        int N2 = 2;
        int P2 = 5;
        System.out.println(N2 + " raised to the power " + P2 + ": " + calculateExponent(N2, P2));
    }
}
```

Answer 5)

```
public class HelloWorld {
    public static int findMaximum(int[] arr, int index) {
        if (index == arr.length - 1) {
            return arr[index];
        } else {
            int current = arr[index];
            int maxInRest = findMaximum(arr, index + 1);
            return Math.max(current, maxInRest);
        }
    }

    public static void main(String[] args) {
        int[] arr1 = {1, 4, 3, -5, -4, 8, 6};
        System.out.println("Maximum element: " + findMaximum(arr1, 0));

        int[] arr2 = {1, 4, 45, 6, 10, -8};
        System.out.println("Maximum element: " + findMaximum(arr2, 0));
    }
}
```

Answer 6)

```
public class HelloWorld {
    public static int findNthTerm(int a, int d, int N) {
        if (N == 1) {
```

```
            return a;
        } else {
            return findNthTerm(a + d, d, N - 1);
        }
    }

    public static void main(String[] args) {
        int a1 = 2;
        int d1 = 1;
        int N1 = 5;
        System.out.println("The " + N1 + "th term of the series is: " + findNthTerm(a1, d1, N1));

        int a2 = 5;
        int d2 = 2;
        int N2 = 10;
        System.out.println("The " + N2 + "th term of the series is: " + findNthTerm(a2, d2, N2));
    }
}
```

ANswer 7)

```
public class HelloWorld {
    public static void printPermutations(String str) {
        permute(str, 0, str.length() - 1);
    }

    private static void permute(String str, int left, int right) {
        if (left == right) {
            System.out.println(str);
        } else {
            for (int i = left; i <= right; i++) {
                str = swap(str, left, i);
                permute(str, left + 1, right);
                str = swap(str, left, i); // backtrack
            }
        }
    }

    private static String swap(String str, int i, int j) {
        char[] charArray = str.toCharArray();
        char temp = charArray[i];
        charArray[i] = charArray[j];
```

```
        charArray[j] = temp;
        return String.valueOf(charArray);
    }

    public static void main(String[] args) {
        String str1 = "ABC";
        System.out.println("Permutations of \"" + str1 + "\":");
        printPermutations(str1);

        String str2 = "XY";
        System.out.println("Permutations of \"" + str2 + "\":");
        printPermutations(str2);
    }
}
```

Answer 8)

```
public class HelloWorld {
    public static int getProduct(int[] arr, int index) {
        if (index == arr.length - 1) {
            return arr[index];
        } else {
            return arr[index] * getProduct(arr, index + 1);
        }
    }

    public static void main(String[] args) {
        int[] arr1 = {1, 2, 3, 4, 5};
        System.out.println("Product of array elements: " + getProduct(arr1, 0));

        int[] arr2 = {1, 6, 3};
        System.out.println("Product of array elements: " + getProduct(arr2, 0));
    }
}
```