# 9. Exercises on Methods

## 9.1 exponent() (method)

exponent(int base, int exp) method that returns an int value of base raised to the power of exp.

```
import java.util.Scanner;
public class Exponent {
   public static void main (String args[]){
        Scanner scan = new Scanner (System.in);
        System.out.print ("Enter the base: ");
        int base = scan.nextInt();
        System.out.print ("Enter the exp: ");
        int exp = scan.nextInt();

        int answer = exponent (base, exp);

        System.out.print (base + " raised to the power of " +
                          exp + " is: " + answer);

   }

   public static int exponent (int base, int exp) {
        int product = 1;
        for (int i =1 ; i<= exp ; i++) {
            product *= base;
        }
        return product;
   }
}
```

```
Enter the base: 3
Enter the exp: 4
3 raised to the power of 4 is: 81
```

ROLL NUMBER :

9.2 isOdd() (method)

boolean method isOdd() which takes an int input and returns true if the int is odd.

```
import java.util.Scanner;

public class OddEvenTest{
    public static void main(String args[]){
        Scanner scan = new Scanner(System.in);
        System.out.print("Enter a number: ");
        int input = scan.nextInt();

        boolean bool = isOdd(input);

        if (bool){
            System.out.println(input + " is an odd number");
        } else {
            System.out.println(input + " is an even number");
        }
    }
    public static boolean isOdd(int num){
        if (num%2 == 0){
            return false;
        } else {
            return true;
        }
    }
}
```

Output :

```
Enter a number: 7
7 is an odd number
```

ROLL NUMBER :

9.3 hasEight() (method)

boolean method called hasEight() which takes an int as input and returns true if the number contains the digit 8.

```
import java.util.Scanner;
public class MagicSum {
    public static void main (String args[]) {
        int sum = 0;
        while (true) {
            Scanner scan = new Scanner (System.in);
            System.out.print ("Enter a positive integer (or -1 to
                                end): ");
            int num = scan.nextInt();
            if (num == -1) {
                System.out.println ("The magic sum is: " + sum);
                break;
            } else {
                if (hasEight (num)) {
                sum += num;
                }
            }
        }
    }
    public static boolean hasEight ( int number) {
        for (int i = number; i>0 ; i/=10 ){
            int dig = i%10;
            if (dig == 8 ){
                return true;
            }
        }
        return false;
    }
}
```

ROLL NUMBER :

output :

```
Enter a positive integer (or -1 to end) : 1
Enter a positive integer (or -1 to end) : 8
Enter a positive integer (or -1 to end) : 88
Enter a positive integer (or -1 to end) : -1
The magic sum is: 96
```

9.4 print() (Array & Method)

Method called print(), which takes an int array and prints its content in the form [a1, a2, a3, ..., an].

```
public class PrintMethodArrg{
    public static void main(String args[]){
        int [] array = new int[4];
        array[0] = 1;
        array[1] = 6;
        array[2] = 4;
        array[3] = 9;
        print(array);
    }
    public static void print(int[] array){
        int len = array.length;
        System.out.print("[");
        for(int i=0; i<len; i++){
            System.out.print(array[i]);
            if(i != len-1){
                System.out.print(",");
            }
            System.out.print(" ");
        }
        System.out.print("]");
    }
}
```

output :

[1, 6, 4, 9]

ROLL NUMBER :

9.5 arrayToString() (Array & method)

Method called arrayToString(), which takes an int array and return a string in the form of [a1, a2, a3, ..., an].

```
public class ArrayToString {
    public static void main (String args[]){
        int [] array = new int [4];
        array [0] = 1;
        array [1] = 6;
        array [2] = 4;
        array [3] = 9;
        System.out.println (arrayToString (array));
    }
    public static String arrayToString (int[] array) {
        String output = "";
        int len = array.length;
        output += "[";
        for (int i=0; i<len; i++){
            output += array[i];
            if (i != ~~arra~~ len-1){
                output += ",";
            }
            output += " ";
        }
        output += "]";
        return output;
    }
}
```

output :

[1, 6, 4, 9]

ROLL NUMBER :

9.6 contains () (Array & method)

boolean method called contains() which takes an array int[] and an int; and returns true if th array contains th given int.

```
public class Contains {
    public static void main (String args[]){
        int[] array = {1,6,2,9};
        int key = 2;
        System.out.println(contains(array, key));
    }
    public static boolean contains(int[] array, int key) {
        int len = array.length;
        for (int i=0; i<len; i++){
            if (array[i] == key) {
                return true;
            }
        }
        return false;
    }
}
```

output : true

9.7 search() (Array & Method)

method called search(), which takes an array of int and an int; and returns th array index if th array contains th given int; or -1 otherwise.

```
public class Search{
    public static void main (String args[]){
        int [] array = new int[4];
        array[0] = 1;
        array[1] = 4;
        array [2] = 6;
        array [3] = 9;

        int key = 4;

        System.out.println (search (array , key ));
    }

    public static int search (int[] array , int key ){
        int len = array.length;
        for (int i= 0; i<len ; i++) {
            if (array[i] == key) {
                return i;
            }
        }
        return -1;
    }
}
```

output : 1

---

9.8 equals() (Array ∆ method)

boolean method called equals(), which takes 2 arrays of int and returns true if th 2 arrays are exactly th same.

```
public class Equals {
    public static void main (String args[]){
        int [] array1 = {1, 6, 4, 9}
        int [] array2 = {1, 6, 2}
        System.out.println( equals (array1, array2));
    }
    public static boolean equals (int[] array1, int[] array2 ){
        int len1 = array1. length;
        int len 2 = array 2. length;
        if (len1 == len 2){
            for (int i = 0; i< len1; i++){
                if (array1[i] == array 2 [i]){
                    continue;
                } else {
                    return false;
                }
            }
            return true;
        } else {
            return false;
        }
    }
}
```

output : false

---

9.9 copyOf() (Array & Method)

boolean method copyOf(), which takes an int Array and returns a copy of the given array.

```
Public class CopyOf {
    public static void main (String args[]){
        int[] array = {9, 8, 4};
        int[] copy = copyOf (array);
    }
    public static int[] copyOf(int[] array) {
        int len = array.length;
        int[] returnArray = new int[len];
        for (int i = 0; i<len ; i++){
            returnArray [i] = array [i];
        }
        return returnArray;
    }
}
```

9.10 swap() (Array and Method)

method called swap() , which takes 2 arrays of int and swaps thir conkents if thy have th same length. It returns true if successfully swapped.

```
public class Swap {
    public static void main (String args []) {
        int[] array1 = {1, 2, 4, 9};
        int [] array2 = {6, 1, 2, 3};
        System.out.println (swap(array1, array2));
    }
```

```
public  static boolean  swap (int[] array1, int[] array2){
    int  len1 = array1.length;
    int  len2 = array2.length;
    int  tmp;
    if (len1 == len2){
        for (int i=0; i<len1; i++){
            tmp = array1[i];
            array1[i] = array2[i];
            array2[i] = tmp;
        }
        return true;
    } else {
        return false;
    }
}
}
```

output : true

---

9.11 reverse() (Array & Method)

Method called reverse() which takes an array of int and reverse its contents.

```
public class Reverse{
    public static void main (String args[]){
        int[] array = {2, 7, 4, 1};
        System.
        [illegible] reverse(array);
    }
```

```
public static void reverse (int[] array){
    int len = array.length;
    int [] returnArray = new int[len];

    for (int i = 0; i<len; i++){
        int j = len-1;
        returnArray[i] = array[j];
    }

    for (int i = 0; i< len; i++){
        System.out.print (returnArray[i] + " ");
    }
}
}
```

output : 14 7 2

---

9.12 Grades Statistics (Array & method)

program called GradesStatistics, which reads in n grades (of int between 0 and 100) and displays the average, minimum, maximum, median and standard deviation.

```
import java.util.Scanner;
import java.util.Arrays;
import java.lang.Math;
public class GradesStatistics {
    public static void main (String args[]){
```

```
        Scanner scan = new Scanner (System.in);
        System.out.print ("Entr th number of students: ");
        int size = scan.nextInt();
        int [] grades = new int [size];
        read Grades (grades);

        System.out.print ("Th grades are: ");
        print (grades);
        System.out.printf ("Th average is: %.2f \n", average(grades));
        System.out.println ("Th median is: %.2f" + median (grades));
        System.out.println ("Th minimum is: %.2f" + min (grades));
        System.out.printf ("Th standard deviation is: %.2f,
                            stdDev (grades));

}

public static void read Grades (int[] array){
        Scanner scan = new Scanner (System.in);
        int size = array.length;
        for (int i = 0; i< size ; i++){
            System.out.print ("Entr th grade for student " +
                              (i+1) + ": ");
            int grade = scan.nextInt();
            array [i] = grade;
        }
}

public static void print (int[] array){
        int len = array.length;
```

```
        System.out.print("The [");
        for (int i=0; i<len; i++){
            if (i==len-1){
                System.out.print(array[i]);
            } else {
                System.out.print(array[i] + ", ");
            }
        }
        System.out.println("]");
    }

    public static double average (int[] array){
        double sum = 0, size = array.length;
        for (int i=0; i<size; i++){
            sum += array[i];
        }
        return (double) sum/size;
    }

    public static double median (int[] array){
        int size = array.length;
        Arrays.sort(array);
        double median = 0;
        if (size%2==0){
            median = (array[(size/2)-1] + array[size/2])/2;
            return median;
        } else if (size%2 != 0){
            median = array[size/2];
            return median;
        }
        return median;
    }
```

```
public static int max (int[] array){
    int max = array [0];
    int size = array.length;
    for (int i=0; i<size; i++){
        if (array[i] > max) {
            max = array [i];
        }
    }
    return max;
}

public static int min (int[] array){
    int min = array [0];
    int size = array.length;
    for (int i= 0 ; i<size ; i++){
        if (array [i] < min){
            min = array[i];
        }
    }
    return min;
}

public static double stdDev (int[] array){
    int size = array.length;
    double mean = average (array);
    int sum = 0;
    for (int i= 0 ; i<size ; i++){
        sum += (array[i] * array[i]) - (mean * mean);
    }
    double stdDev = (double) Math.sqrt ((sum/size));
    return stdDev;
}
}
```

ROLL NUMBER :

Output :

```
Enter th number of students : 4
Enter th grade for student 1: 50
Enter the grade for student 2: 51
Enter th grade for student 3: 56
Enter th grade for student 4: 53
Th grades are: [50, 51, 56, 53]
Th average is : 52.50
Th median is : 52.00
Th minimum is : 50
Th maximum is: 56
Th standard deviation is : 2.29
```

9.13 GradesHistogram (Array & method)

program called GradesHistogram, which reads in n grades and displays th horizontal and vertical histograms.

```
import java.util.Scanner;

public class GradesHistogram {
    public static void main (String args[]) {
        Scanner scan = new Scanner (System.in);
        System.out.print ("Enter th number of students: ");
        int size = scan.nextInt();

        int [] marks = new int [size];

        int zero = 0; ten = 0; twenty = 0, thirty = 0,
            forty = 0, fifty = 0, sixty = 0, seventy = 0,
            eighty = 0, ninety = 0;
```

```
for (int i=0 ; i<sum ; i++) {
    System.out.print ("Enter the grade for student " +
                      (i+1) + " : ");
    int grade = scan.nextInt();
    marks[i] = grade;
    if (grade >=0 && grade <=9) {
        zero += 1;
    } else if (grade >=10 && grade<= 19) {
        ten += 1;
    } else if (grade >=20 && grade <= 29){
        twenty += 1;
    } else if (grade >= 30 && grade <=39) {
        thirty += 1;
    } else if (grade>=40 && grade <=49) {
        forty += 1;
    } else if (grade>=50 && grade <= 59){
        fifty += 1;
    } else if (grade >= 60 && grade<= 69) {
        sixty += 1;
    } else if (grade>=70 && grade <= 79){
        seventy += 1;
    } else if (grade >= 80 && grade<= 89){
        eighty += 1;
    } else if (grade>=90 && grade <=100){
        ninety += 1;
    }
}
System.out.print(" 0 - 9: ");
for (int i=1 ; i<=zero ; i++) { System.out.print ("*"); }
System.out.println();
```

```
        System.out.print ("10 - 19: ");
        for (int i=1 ; i<=ten ; i++) { System.out.print ("*"); }
        System. out. println();
        System.out.print ("20 - 29: ");
        for ( int i=1 ; i<= twenty; i++) { System.out. print ("*");}
        System. out. println ();
        System.out.print ("30 - 39: ");
        for( int i= 1; i<=thirty ; i++) { System. out. print ("*"); }
        System.out.println ();
        System. out. print ("40 - 49: ");
        for ( int i=1 ; i<= forty ; i++) { System. out. print ("*"); }
        System. out. println();
        System. out. print ("50 - 59: ");
        for ( int i=1 ; i<= fifty ; i++) { System. out. print ("*"); }
        System. out. println ();
        System. out. print ("60 - 69: ");
        for (int i=1 ; i<= sixty ; i++) { System. out. print ("*"); }
        System. out. println();
        System. out- print ("70 -79: ");
        for (int i=1 ; i<= seventy; i++) { System.out. print ("*"); }
        System. out. println ();
        System.out. print ("80 - 89: ");
        for (int i=1 ; i<=eighty ; i++) { System.out. print ("*"); }
        System. out. println ();
        System. out. print ("90 - 100: ");
        for (int i=1 ; i<= ninety ; i++) { System. out. print ("*"); }
        System.out. println();
    }
}
```

output :

```
Enter the number of students: 6
Enter the grade for student 1: 89
Enter the grade for student 2: 8
Enter the grade for student 3: 9
Enter the grade for student 4: 30
Enter the grade for student 5: 18
Enter the grade for student 6: 17

0-9 : * *
10-19 : * *
20-29 :
30-39 : *
40-49 :
50-59 :
60-69 :
70-79 :
80-89 : *
90-100 :
```