**Java programming**

**Assignment on Methods**

***QUESTION ONE:***

Create a java project, name it methods\_in\_java, in the project create a package named java\_methods and in the package, create a class and named methods.

b. in the classmethods, write a method that asks user to enter three numbers, using if statement determine the largest number, the smallest number and display the results in the following format.   
The smallest number: ?  
The largest number number: ?  
? is your largest and ? smallest number.

***QUESTION 2:***

Create a java project, package and class. In the class, write a method that asks a lecturer to enter marks for three units, java programming, networking and maths. The method should compute the average marks for three units and output the data in the following format.

marks for java programming is: ?  
marks for networking is: ?

marks for maths is: ?

the average is: ?

package java\_methods;

import java.util.Scanner;

public class Methods {

public static void main(String[] args) {

Scanner scanner = new Scanner(System.in);

// Prompt the user to enter three numbers

System.out.print("Enter the first number: ");

double num1 = scanner.nextDouble();

System.out.print("Enter the second number: ");

double num2 = scanner.nextDouble();

System.out.print("Enter the third number: ");

double num3 = scanner.nextDouble();

// Determine the largest and smallest numbers

double largest = Math.max(Math.max(num1, num2), num3);

double smallest = Math.min(Math.min(num1, num2), num3);

// Display the results

System.out.println("\nThe smallest number: " + smallest);

System.out.println("The largest number: " + largest);

System.out.println(smallest + " is your smallest number, and " + largest + " is your largest number.");

// Close the scanner

scanner.close();

}

}

***QUESTION 3:***

Write a method that asks user to enter the year, the program should check if the year is a leap year, and output the text the year you entered is a leap year.

public class YearChecker {

public static void main(String[] args) {

YearChecker yearChecker = new YearChecker();

yearChecker.checkLeapYear();

}

public void checkLeapYear() {

// Use System.console() to read input from the user

System.out.print("Enter a year: ");

String input = System.console().readLine();

int year = Integer.parseInt(input);

if ((year % 4 == 0 && year % 100 != 0) || (year % 400 == 0)) {

System.out.println("The year you entered is a leap year.");

} else {

System.out.println("The year you entered is not a leap year.");

}

}

}

Create a java project, a package and a class, in the class, write a program to calculate the area of a triangle. The program should have thee non-static methods:

One of the methods should ask the user to enter the base and the height of a triangle.

The other method should compute the area of the rectangle.

The other method should output the calculated area of the triangle an display it to the user.

public class Triangle {

private double base;

private double height;

// Method to ask user for base and height

public void inputBaseAndHeight() {

try {

System.out.print("Enter the base of the triangle: ");

base = readDouble();

System.out.print("Enter the height of the triangle: ");

height = readDouble();

} catch (NumberFormatException e) {

System.err.println("Error: Invalid input. Please enter valid numbers.");

}

}

// Custom method to read a double value from console

private double readDouble() throws NumberFormatException {

String input = System.console().readLine();

return Double.parseDouble(input);

}

// Method to compute area of the triangle

public double calculateArea() {

return 0.5 \* base \* height;

}

// Method to output and display the calculated area

public void displayArea() {

System.out.println("The area of the triangle is: " + calculateArea());

}

public static void main(String[] args) {

Triangle triangle = new Triangle();

triangle.inputBaseAndHeight();

triangle.displayArea();

}

}

***QUESTION 4***

Create a java program that has one non-static method, two static methods and a constructor.

public class ExampleClass {

private int number;

// Constructor

public ExampleClass(int number) {

this.number = number;

}

// Non-static method

public void displayNumber() {

System.out.println("The number is: " + number);

}

// Static method 1

public static int addNumbers(int a, int b) {

return a + b;

}

// Static method 2

public static void printMessage(String message) {

System.out.println(message);

}

public static void main(String[] args) {

// Create an instance of ExampleClass using the constructor

ExampleClass example = new ExampleClass(10);

// Call the non-static method

example.displayNumber();

// Call the static methods

int result = ExampleClass.addNumbers(5, 3);

System.out.println("The sum is: " + result);

ExampleClass.printMessage("Hello, this is a static method!");

}

}

**Question one: [15 marks]**

1. A prime number is a number that is evenly divisible only by itself and 1. For example, the number 5 is prime because it can be evenly divided only by 1 and 5. The number 6, however, is not prime because it can be divided evenly by 1, 2, 4, and 6.   
   Write a method named isPrime, which takes an integer as an argument and returns true if the argument is a prime number, or false otherwise. Also write main method that displays prime numbers between 1 to 500.

public class PrimeNumbers {

public static void main(String[] args) {

System.out.println("Prime numbers between 1 and 500 are:");

for (int i = 1; i <= 500; i++) {

if (isPrime(i)) {

System.out.print(i + " ");

}

}

}

public static boolean isPrime(int number) {

if (number <= 1) {

return false;

}

for (int i = 2; i <= Math.sqrt(number); i++) {

if (number % i == 0) {

return false;

}

}

return true;

}

}

1. Each new term in the Fibonacci sequence is generated by adding the previous two terms. By starting with 1 and 2, the first 10 terms will be: 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, ...

public class FibonacciSequence {

public static void main(String[] args) {

int n = 10; // Number of terms to display

int firstTerm = 1, secondTerm = 2;

System.out.println("First " + n + " terms of the Fibonacci sequence:");

for (int i = 1; i <= n; ++i) {

System.out.print(firstTerm + " ");

// Compute the next term

int nextTerm = firstTerm + secondTerm;

firstTerm = secondTerm;

secondTerm = nextTerm;

}

}

}

1. By considering the terms in the Fibonacci sequence whose values do not exceed four million, write a Java method to find the sum of all the even- valued terms. public class FibonacciSequence {

public class EvenFibonacciSum {

public static void main(String[] args) {

System.out.println("Sum of even-valued Fibonacci terms not exceeding four million: " + sumEvenFibonacci(4000000));

}

public static int sumEvenFibonacci(int limit) {

int sum = 0;

int firstTerm = 1;

int secondTerm = 2;

while (firstTerm <= limit) {

if (firstTerm % 2 == 0) {

sum += firstTerm;

}

// Compute the next term

int nextTerm = firstTerm + secondTerm;

firstTerm = secondTerm;

secondTerm = nextTerm;

}

return sum;

}

}

**Question two: [15 marks]**

A palindrome number is a number that remain the same when read from behind or front ( a number that is equal to reverse of number) for example, 353 is palindrome because reverse of 353 is 353 (you see the number remains the same). But a number like 591 is not palindrome because reverse of 591 is 195 which is not equal to 591. Write Java program to check if a number entered by the user is palindrome or not. You should provide the user with a GUI interface to enter the number and display the results on the same interface.

public class PalindromeCheckerGUI {

public static void main(String[] args) {

if (java.awt.GraphicsEnvironment.isHeadless()) {

System.out.println("No graphical environment detected. Please run this program in a graphical environment.");

return;

}

// Create the frame

javax.swing.JFrame frame = new javax.swing.JFrame("Palindrome Checker");

frame.setSize(400, 200);

frame.setDefaultCloseOperation(javax.swing.JFrame.EXIT\_ON\_CLOSE);

frame.setLayout(null);

// Create the label and text field for input

javax.swing.JLabel label = new javax.swing.JLabel("Enter a number:");

label.setBounds(50, 30, 100, 30);

frame.add(label);

javax.swing.JTextField textField = new javax.swing.JTextField();

textField.setBounds(160, 30, 150, 30);

frame.add(textField);

// Create the button to check palindrome

javax.swing.JButton button = new javax.swing.JButton("Check");

button.setBounds(150, 80, 100, 30);

frame.add(button);

// Create the label to display the result

javax.swing.JLabel resultLabel = new javax.swing.JLabel("");

resultLabel.setBounds(50, 120, 300, 30);

frame.add(resultLabel);

// Add action listener to the button

button.addActionListener(new java.awt.event.ActionListener() {

@Override

public void actionPerformed(java.awt.event.ActionEvent e) {

String input = textField.getText();

if (isPalindrome(input)) {

resultLabel.setText(input + " is a palindrome.");

} else {

resultLabel.setText(input + " is not a palindrome.");

}

}

});

// Set the frame visibility

frame.setVisible(true);

}

public static boolean isPalindrome(String number) {

int length = number.length();

for (int i = 0; i < length / 2; i++) {

if (number.charAt(i) != number.charAt(length - 1 - i)) {

return false;

}

}

return true;

}

}

**Question three: [15 marks]**

Write a Java program that takes 15 values of type integer as inputs from user, store the values in an array.

a) Print the values stored in the array on screen.  
b) Ask user to enter a number, check if that number (entered by user) is present in array

or not. If it is present print, “the number found at index (index of the number) ” and the text “number not found in this array”

c) Create another array, copy all the elements from the existing array to the new array but in reverse order. Now print the elements of the new array on the screen

d) Get the sum and product of all elements of your array. Print product and the sum each on its own line.

public class ArrayOperations {

public static void main(String[] args) {

java.util.Scanner scanner = new java.util.Scanner(System.in);

int[] array = new int[15];

// a) Take 15 integer inputs from the user and store them in the array

System.out.println("Enter 15 integers:");

for (int i = 0; i < 15; i++) {

array[i] = scanner.nextInt();

}

// Print the values stored in the array

System.out.println("Values stored in the array:");

for (int i = 0; i < 15; i++) {

System.out.print(array[i] + " ");

}

System.out.println();

// b) Check if a number entered by the user is present in the array

System.out.print("Enter a number to search in the array: ");

int searchNumber = scanner.nextInt();

boolean found = false;

for (int i = 0; i < 15; i++) {

if (array[i] == searchNumber) {

System.out.println("The number found at index " + i);

found = true;

break;

}

}

if (!found) {

System.out.println("Number not found in this array");

}

// c) Copy elements to another array in reverse order and print

int[] reversedArray = new int[15];

for (int i = 0; i < 15; i++) {

reversedArray[i] = array[14 - i];

}

System.out.println("Values in the new array in reverse order:");

for (int i = 0; i < 15; i++) {

System.out.print(reversedArray[i] + " ");

}

System.out.println();

// d) Get the sum and product of all elements in the array

int sum = 0;

int product = 1;

for (int i = 0; i < 15; i++) {

sum += array[i];

product \*= array[i];

}

System.out.println("Sum of all elements: " + sum);

System.out.println("Product of all elements: " + product);

scanner.close();

}

}