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Java programming CAT

Instructions:

Answer all questions.

Question one: [5 marks]

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, ...

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.

ANSW:

```
public class FibonacciSum {

    public static void main(String[] args) {

        int a = 1;

        int b = 2;

        int c = a + b;

        int sum = 2; // Initialize sum with the value of the first even term (2)


        while (c <= 4000000) {

            if (c % 2 == 0) {

                sum += c; // Add even terms to the sum

            }

            a = b;

            b = c;

            c = a + b; // Calculate the next term in the Fibonacci sequence
```

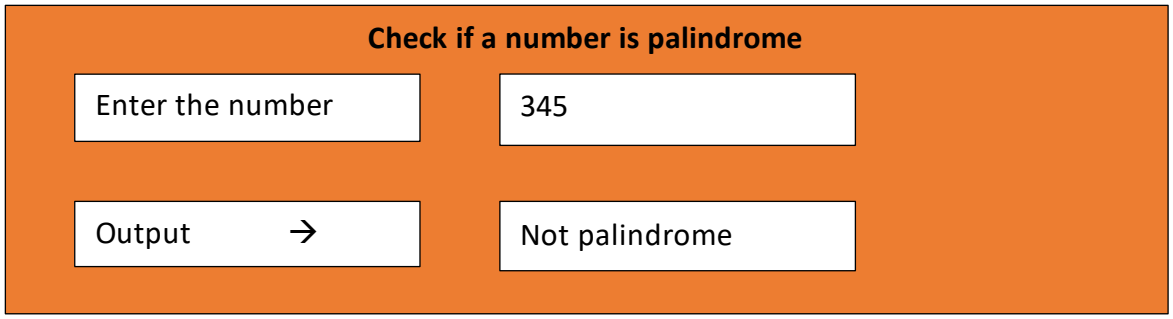
```
        }


        System.out.println("Sum of even Fibonacci terms below 4 million: " + sum);
    }
}
```

Question two: [10 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.

The interface:



ANSW:

```
import javax.swing.*;

import java.awt.*;

import java.awt.event.ActionEvent;

import java.awt.event.ActionListener;


public class PalindromeChecker extends JFrame implements ActionListener {

    private JTextField numberField;

    private JLabel resultLabel;
```

```
public PalindromeChecker() {
    setTitle("Palindrome Checker");
    setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
    setSize(300, 150);
    setLayout(new FlowLayout());

    JLabel numberLabel = new JLabel("Enter a number:");
    numberField = new JTextField(10);
    JButton checkButton = new JButton("Check");
    resultLabel = new JLabel();

    checkButton.addActionListener(this);

    add(numberLabel);
    add(numberField);
    add(checkButton);
    add(resultLabel);

    setVisible(true);
}

public static boolean isPalindrome(int number) {
    int reversed = 0, remainder, original;
```

```
    original = number;

    while (number != 0) {
        remainder = number % 10;
        reversed = reversed * 10 + remainder;
        number /= 10;
    }

    return original == reversed;
}

public void actionPerformed(ActionEvent e) {
    try {
        int number = Integer.parseInt(numberField.getText());
        if (isPalindrome(number)) {
            resultLabel.setText("The number is a palindrome.");
        } else {
            resultLabel.setText("The number is not a palindrome.");
        }
    } catch (NumberFormatException ex) {
        resultLabel.setText("Invalid input. Please enter a number.");
    }
}
```

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

        new PalindromeChecker();

    }

}
```

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) Sort the arrays in ascending order.
d) 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
e) Get the sum and product of all elements of your array. Print product and the sum each on its own line.

ANSW:

```
import java.util.Arrays;

import java.util.Scanner;



public class ArrayExample {

    public static void main(String[] args) {

        Scanner scanner = new Scanner(System.in);

        int[] arr = new int[15];



        // a) Get 15 integer values from the user and store them in the array

        System.out.println("Enter 15 integer values:");

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

```
    arr[i] = scanner.nextInt();
}

// a) Print the values stored in the array
System.out.println("Values in the array:");
for (int value : arr) {
    System.out.print(value + " ");
}
System.out.println();

// b) Check if a number is present in the array
System.out.print("Enter a number to search: ");
int searchNumber = scanner.nextInt();
boolean found = false;
for (int i = 0; i < arr.length; i++) {
    if (arr[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) Sort the array in ascending order
Arrays.sort(arr);
System.out.println("Array sorted in ascending order:");
for (int value : arr) {
    System.out.print(value + " ");
}
System.out.println();

// d) Create a new array with elements in reverse order
int[] reversedArr = new int[15];
for (int i = 0; i < 15; i++) {
    reversedArr[i] = arr[14 - i];
}
System.out.println("Array in reverse order:");
for (int value : reversedArr) {
    System.out.print(value + " ");
}
System.out.println();

// e) Calculate the sum and product of all elements
int sum = 0;
int product = 1;
for (int value : arr) {
```

```
            sum += value;
            product *= value;
        }
        System.out.println("Sum of all elements: " + sum);
        System.out.println("Product of all elements: " + product);
    }
}
```