PSLG Week 01

Ran by Amy and Ben

DLSH

ICTLC Online QR Code:

Today's Agenda:

- 2D Arrays.
- Scanners and how to use them.

2D Arrays

- 2D arrays are used to represent tables, matrices, images, game boards, etc.
- You now use two indexes instead of one index.

Syntax:

- int[][] nameOfArray = new int[row][col];
  - Example: int[][] matrix = new int[2][3];

Problem 1

Create a class called SumOfElements that includes a method to calculate the sum of all elements in a 2D array. The array should be filled with random integers, and the method should compute and return the sum of these numbers.

In the main method, create an instance of the class, call the method, and display the sum of all the elements in the 2D array.

Solution

```java
public class SumOfElements {
    1 usage
    public static void sumOfAllElements(int row, int col){

        //array being initialised with the row and col variables
        int[][] array = new int[row][col];


        //for loop to fill the 2d array with the random numbers
        for(int i = 0; i < row; i++){
            for(int j = 0; j < col; j++){
                array[i][j] = (int)(Math.random() * 100);
                System.out.println(array[i][j]); //print array
            }
            System.out.println(); //new line after printing array
        }

        int sum = 0;
        for(int i = 0; i < row; i++){
            for(int j = 0; j < col; j++){
                sum += array[i][j];
            }
        }
        System.out.println("The sum of all elements : "+ sum);
    }

    public static void main(String[] args) {
        sumOfAllElements( row: 2,  col: 3);
    }
}
```

Scanners

- Scanner is a user or keyboard input.

Syntax:

- Scanner name = new Scanner(System.in);
  - new Scanner creates scanner object in memory
  - System.in is a connection between the scanner object and the keyboard.

Problem 2

Create a class and name it CelsiusFahrenheit. In this class, make a method that asks the user for a temperature in celsius and converts that into fahrenheit, outputting the temperature in fahrenheit.

In the main method, create an instance of the class and call the method to display the temperature in fahrenheit.

Fahrenheit = ((celsius * 9/5) +32)

Import java.util.Scanner;

Solution

```java
import java.util.Scanner;

public class CelsiusFahrenheit {
    1 usage
    public static void celsiusToFahrenheit(double celsius){

        //find fahrenheit
        double fahrenheit = ((celsius * 9/5) + 32);

        System.out.println("The fahrenheit equivalence is: " + fahrenheit);
    }

    public static void main(String[] args) {

        //scanner to input temperature in celsius
        Scanner userInput = new Scanner(System.in);

        System.out.println("Enter your temperature in celsius: ");

        //parse user input into a double
        double celsius = userInput.nextDouble();

        celsiusToFahrenheit(celsius);
    }
}
```

Problem 3

Write a java program that creates a pascal triangle after taking scanner input after the following prompt:

“Please enter the row length of our pascal triangle”

The pascal triangle must be generated and printed from a 2-D array and for the uninitiated a pascal triangle is a triangle that follows the following rules.

Problem 3

Pascal's Triangle is a triangular array where:

- The first and last elements of each row are always 1.
- Each interior number is the sum of the two numbers directly above it.

For example, for n = 5, the output should be:

1

1 1

1 2 1

1 3 3 1

1 4 6 4 1

Solution :

```java
public class Problem3
{
    public static void main(String[] args)
    {
        // Initialise our scanner and read user input
        Scanner in = new Scanner(System.in);

        System.out.println("Please enter the row length of our pascal triangle : ");
        int row = in.nextInt();

        // Initialise our 2D-array;
        int[][] pascTriag = new int[row][row];

        // Iterate through and fill the triangle with the relevant data
        for(int i = 0; i< pascTriag.length; i++)
        {
            for(int j = 0; j<=i; j++)
            {
                // Base case : Check if J = 0 OR i
                if(j == 0 || j == i)
                {
                    // assign the index a value of 1
                    pascTriag[i][j] = 1;
                }else{
                    // Otherwise it's the sum of the two adjacent terms above it
                    pascTriag[i][j] = pascTriag[i-1][j] + pascTriag[i-1][j-1];
                }
            }

        }
```

Solution

```
41
42          // Print out array at the end
43          System.out.printf("Your triangle for length %d \n",row);
44          for(int i = 0; i<pascTriag.length; i++)
45          {
46              for(int j = 0; j<=i; j++)
47              {
48                  System.out.print(pascTriag[i][j] + " ");
49              }
50              System.out.println();
51          }
52
53
54      }
55
56  }
```