Lecture 18

2D-Array InClass Questions + ArrayList

Rotate an N * N matrix by 180 Degrees

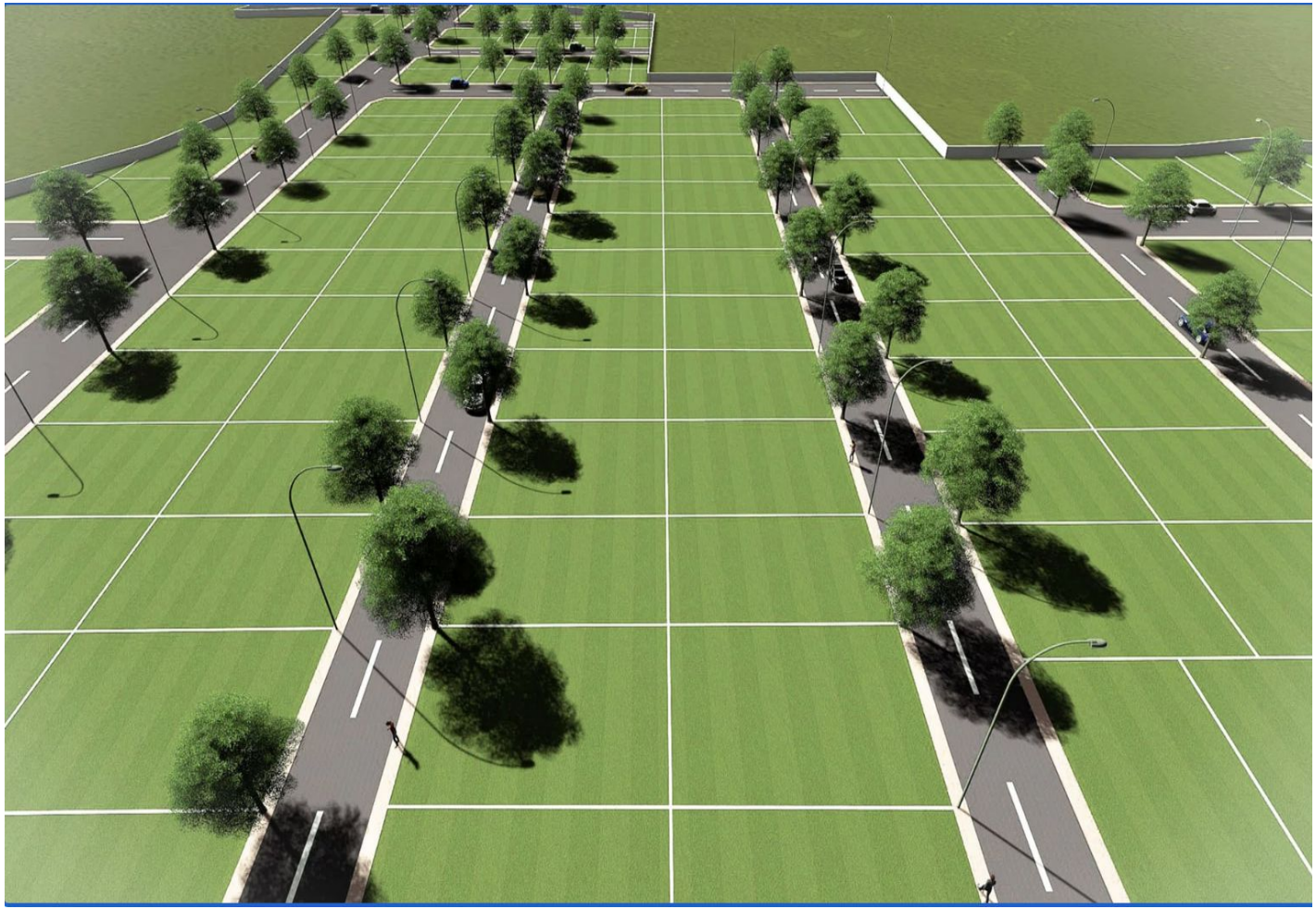
```
/**
  1   2  3  4 ->  4  3  2 1
  5   6  7  8 ->  8  7  6 5
  9  10 11 12 -> 12 11 10 9
  13 14 15 16 -> 16 15 14 13

  // Start from the last row -- 3 2 1 0
  // In each row print from the last column onwards -- 3 2 1 0

  180 Degrees
  16 15 14 13
  12 11 10  9
  8   7  6  5
  4   3  2  1
  **/
  public static void prin180Degrees( int[][] matrix) {
      int rows = matrix.length;
      int cols = matrix[ 0].length;

      for(int i = rows -  1; i >= 0; i--) {  // This is for rows
          for(int j = cols -  1; j >= 0; j-- ) {  // This is for columns
             System.out.print(matrix[i][j] +    " ");
          }
          System.out.println();
      }
  }
```

Simple Determinant of a Matrix

```
public static void printSimpleDeterminant(int[][] matrix) {
    int determinant = (matrix[0][0] * matrix[1][1]) - (matrix[0][1] * matrix[1][0]);
    System.out.println(determinant);
}
```

ArrayList

Roll Number	Student Name	Class	Section
2101	AADESH.V	II	B
2102	AAKASH.A	II	B
2103	AJAY DURAI.K	II	B
2104	AMEERUDEEN.S	II	B
2105	ANIRUDHRAM	II	B
2106	DINESH KUMAR.S	II	B
2107	HAREESHWARAN .T	II	B
2108	JEEVITH	II	B
2109	KAMALESHWAR	II	B
2110	KETHEN VIGNESH.N.S	II	B
2111	KRISHNA B.T	II	B
2112	LOKESH SHEKAR M.S	II	B
2113	MD.SHAHID FARAZ.M	II	B
2114	NAVJITH ROSHAN T	II	B
2115	V PAWAN NARAYAN	II	B
2116	PRITHVI	II	B
2117	ROHIT	II	B
2118	SANJAY.G	II	B
2119	SARVESH AAKASH	II	B
2120	SASVANTH	II	B
2121	SHAIK ALRUDEEN	II	B
2122	SREEVARSHAN	II	B
2123	JITHESH KUMAR	II	B
2124	VIJAYANATH	II	B
2125	YASHWAA.S	II	B
2126	YUVAN SHANKAR	II	B
2127	AKSHITHA	II	B
2128	ANANDHITHA	II	B
2129	ANUSHREE	II	B
2130	BHARGAVI.J.K	II	B
2131	DEEKSHITHA.R	II	B
2132	DEEPTHI.A	II	B
2133	DIVYA	II	B
2134	HARSHITHA	II	B



```
 // What are the problems with Arrays? -- You can't change the size of the array dynamically
 // What is an ArrayList? -- It is a collection of elements where you can increase/decrease the size dynamically
 // How do you create a new ArrayList? -- ArrayList<String> name = new ArrayList<String>();
 // How to add elements in the ArrayList? -- name.add("Ishan")
```

What’s the problem with Arrays?

You can’t change the size of the array dynamically

What’s an ArrayList?

It’s a collection of elements which allows you to increase or decrease the size of the collection dynamically

How do you create a new ArrayList?

- Syntax:
  - `ArrayList<DataType> <variable-name> = new ArrayList<DataType>();`
- Examples:
  - `ArrayList<String> myStringArrayList = new ArrayList<String>();`
  - `ArrayList<Integer> myIntegerArrayList = new ArrayList<Integer>();`
  - `ArrayList<Float> myFloatArrayList = new ArrayList<Float>();`
  - `ArrayList<Boolean> myBooleanArrayList = new ArrayList<Boolean>();`

ArrayList Operations

- Add an element to an ArrayList
  - `ArrayList<String> students = new ArrayList<String>();`
  - `students.add("Varun");`
  - `students.add("Piyush");`
- Add an element to an ArrayList at a particular index
  - `students.add(1, "Ishan");`
- Remove an element from an ArrayList by element value
  - `students.remove("Varun");`

How do you know the index of the elements in the list?

Elements follow the order of insertion

- `ArrayList<String> students = new ArrayList<String>();`
- `students.add("Varun");`
- `students.add("Piyush");`
- `students.add("Sandeep");`

- `Index 0 = Varun`
- `Index 1 = Piyush`
- `Index 2 = Sandeep`

How does the element index change when you remove an element

- `ArrayList<String> students = new ArrayList<String>();`
- `students.add("Varun");`
- `students.add("Piyush");`
- `students.add("Sandeep");`

- Index 0 = Varun
- Index 1 = Piyush
- Index 2 = Sandeep
  - `students.remove("Piyush");`
- Index 0 = Varun
- Index 1 = Sandeep

How does the element index change when you add an element at a particular index

- `ArrayList<String> students = new ArrayList<String>();`
- `students.add("Varun");`
- `students.add("Piyush");`
- `students.add("Sandeep");`

- Index 0 = Varun
- Index 1 = Piyush
- Index 2 = Sandeep

- `students.add(1,"Neeraj");`

- Index 0 = Varun
- Index 1 = Neeraj
- Index 2 = Piyush
- Index 2 = Sandeep