PROGRAM 12

QUESTION

Write a program to enter a m x n matrix and print the sum of non-boundary(inner) elements.

Class Name – SumOfNonBoundaryElements

Instance variable:

* arr[][] – Integer array to store the input matrix.
* int s – to store the sum of non boundary(inner) elements.

Methods:

* SumOfNonBoundaryElements (int mm) – to initialize input in the matrix.
* void input() – to take input in the Matrix.
* void innerSum() - to calculate sum of inner elements.
* void display() – to display the original matrix along with sum of inner elements.

ALGORITHM

1. Initialize the class `SumOfNonBoundaryElement` with an integer `M` as a parameter, representing the number of rows and columns for the square matrix.
2. Inside the constructor:
   * + 1. Set `M` to the provided value.
       2. Initialize the sum `s` to 0.
       3. Create a 2D integer array `arr` with dimensions M x M.
3. Implement the `input` method:
   * + 1. Create a `Scanner` object `in` to read input from the console.
       2. Display a prompt to the user: "Enter the matrix elements."
       3. Use nested loops to iterate through each row and column of the matrix:
       4. Read an integer value from the user using `in.nextInt()`.
       5. Store the read value in the corresponding position of the `arr` 2D array.
4. Implement the `innerSum` method:
   * + 1. Initialize a variable `s` to 0 to represent the sum of inner elements.
       2. Use nested loops to iterate through each row and column of the matrix:
       3. Check if the current element is not on the boundary by verifying that it is not on the first row, first column, last row, or last column.
       4. If the condition is met, add the value of the current element to

`s`.

1. Implement the `display` method:
   * + 1. Display the message: "The original Matrix is : "
       2. Use nested loops to iterate through each row and column of the matrix:
       3. Print the value of the current element followed by a space.
       4. Print a newline character after each row.
       5. Display the message: "The inner sum is " followed by the value of `s`.
2. In the `main` method:
   * + 1. Create a `Scanner` object `sc` to read input from the console.
       2. Display a prompt to the user: "Enter the number of rows."
       3. Read an integer `n` from the user to represent the number of rows (and columns) of the square matrix.
       4. Create an instance of the `SumOfNonBoundaryElement` class with `n` as the argument.
       5. Call the `input` method to input matrix elements.
       6. Call the `innerSum` method to compute the sum of inner elements.
       7. Call the `display` method to display the original matrix and the sum of inner elements.
3. END.

**VARIABLE DESCRIPTION TABLE**

|  |  |  |
| --- | --- | --- |
| **Variable Name** | **Data Type** | **Variable Description** |
| arr | int | 2D integer array representing the matrix. |
| s | int | Integer variable to store the sum of elements. |
| m | int | Integer representing the number of rows/columns in the matrix. |
| mm | int | Integer parameter passed to the constructor to set the matrix size. |
| in | Scanner | Scanner object for reading input from the console. |
| sc | Scanner | Scanner object for reading input from the console. |
| n | int | Integer representing the number of rows/columns in the matrix (user input) |
| obj | SumNonOfBoundaryElement | Instance of the SumNonOfBoundaryElement class |