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cmsc140  Prof. Laratta 12/5/21

project 5

Pseudocode

1. Declare global const variables: ROWS = 3, COLS = 3, MIN = 1, MAX = 9;
2. Function prototypes: bool isMagicSquare, bool checkRange, bool checkUnique, bool checkRowSum, bool checkColSum, bool checkDiagSum, void fillArray, void showArray.
3. Inside int main.
4. Declare arrays, int magicArrayRow1[COLS], int magicArrayRow2[COLS], int magicArrayRow3[COLS]
5. Do while loop (do)
6. Call out function void fillArray
7. Call out function void showArray
8. Call out function bool checkRange
9. Call out function bool checkUnique
10. Call out function bool checkRowSum
11. Call out function bool checkColSum
12. Call out function bool checkDiagSum
13. Call out function bool isMagicSquare
14. If isMagicSquare == true, then cout “this is a Lo Shu magic square”.
15. Else cout “this is not a Lo Shu magic square”
16. Do while loop (while)
17. Function fillArray definition:
18. Cout asking for 3 ints for the first row with a cin statement to get the ints and stores them into magicArrayRow1
19. Cout asking for 3 ints for the second row with a cin statement to get the ints and stores them into magicArrayRow2
20. Cout asking for 3 ints for the third row with a cin statement to get the ints and stores them into magicArrayRow3
21. Function showArray definition:
22. Use for loops to display the data in each of the arrays
23. Function checkRange definition:
24. if arrayRow1, arrayRow2, arrayRow3 are in between the const variables MAX and MIN then will return true
25. else return false
26. Function checkUnique definition:
27. If only one occurrence of numbers between 1-9 are entered, return true
28. Else return false
29. Function checkRowSum definition:
30. If the numbers in arrayRow1 are equal to 15 then return true
31. Else return false
32. Function checkColSum definition:
33. If the numbers in arrayRow2 are equal to 15 then return true
34. Else return false
35. Function checkDiagSum definition:
36. If the numbers in arrayRow3 are equal to 15 then return true
37. Else return false
38. Function isMagicSquare definition:
39. If all other functions return true, then return true
40. Else return false

Diagram, schematic

Description automatically generatedFlowchart

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Test Case # | Input | Actual Input | Expected Output Is Magic? | Actual Output Is Magic? | Did the test pass? |
| 1 | 1 2 3  4 5 6  7 8 10  y  2 2 2  2 2 2  2 2 2  n | 1 2 3  4 5 6  7 8 10  y  2 2 2  2 2 2  2 2 2  n | No | No | Yes |
| 2 | 2 7 6  9 5 1  4 3 8  n | 2 7 6  9 5 1  4 3 8  n | Yes | Yes | Yes |
| 3 | 10 20 6  8 12 16  18 4 14  n | 10 20 6  8 12 16  18 4 14  n | No | No | Yes |
| 4 | 4 9 2  3 5 7  8 1 6  n | 4 9 2  3 5 7  8 1 6  n | Yes | Yes | Yes |

Test case 1

Text

Description automatically generated

Test case 2

A picture containing text

Description automatically generated

Test case 3

Text

Description automatically generated

Test case 4

Text

Description automatically generated

Lessons Learned

In this project, I learned how to use functions properly. In the past project, I was very confused about using functions and passing data between functions. I thought that I would have a hard time figuring out how to pass an array through functions, but I was surprised to see that it wasn’t as difficult as I imagined. Through this project, I have mastered using functions in my program. I feel more confident to use functions in future programs.

Another lesson that I learned is to include cout statements to display the return of the functions, just as a debugging reference. When working with many functions, I needed to make sure that everything worked. I could not tell if my functions were returning the correct bool value. I added statements that would show the return type in the console after I had entered values into the array. This was very helpful to me, and I should always remember to use it.

Another lesson that I learned is to make sure that my test cases are testing the maximum extent of my program. I had many errors in my program, and I wasn’t sure if it would work when doing the test cases. I wanted to ensure that my program would do what it is designed to do and not break when I input things that test each of my bool functions. I didn’t find any errors when testing my program, but in the future, I should make sure that all types of tests on my program would work and not break.