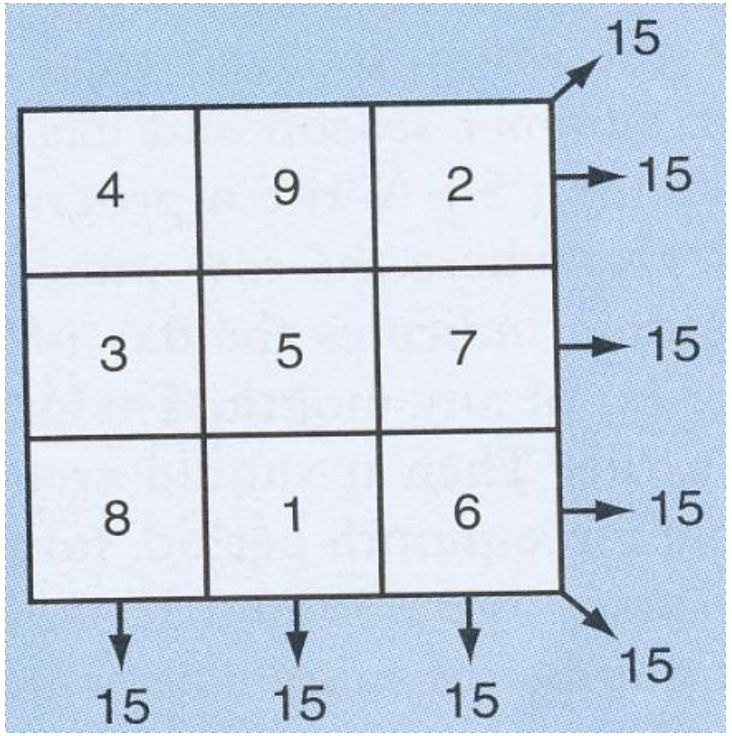
Laboratory 07

COMSC-044

Lo Shu Magic Square

- The Lo Shu Magic Square is a grid with 3 rows and 3 columns shown below. The Lo Shu Magic Square has the following properties:
  - The grid contains the numbers 1 through 9 exactly.
  - The sum of each row, each column, and each diagonal all add up to the same number (see below).

4	9	2
3	5	7
8	1	6



Laboratory 07

- In a program, you can simulate a magic square using a two-dimensional array.
- Write a function that accepts a two-dimensional array as an argument, and determines whether the array is a Lo Shu Magic Square or not.
- Test the function in a program. Call your program *YourName*_Lab07.cpp .
- Hint: Before you begin, it would be helpful for you to answer the following questions.
  - Once you are clear on the answers to these questions, then you can proceed with your coding.

Laboratory 07 – Part 1

- Question 1: What is the constant unchanging number of rows, and number of columns that the array that you will use, will always have?

  _____

- Question 2: What is the sum that the 3 elements in a row, a column, or a diagonal will always add up to? _____
- Question 3: How many different tests (i.e. if statements) will you have to do to determine if the square is a Lo Shu square?

  _____

- Question 4: Shown above are the values of a true Lo Shu Magic Square. Can you think of a different arrangement of numbers that will also result in a Lo Shu Magic Square? What are they?

Laboratory 07 – Part 2

```
//  This is your Lo Shu Magic Square Detector Template
//  You only need to write the function at the bottom (see next page)
#include <iostream>
using namespace std;

   const int CORRECTSUM = 15;
   const int SIZE = 3;
   int loShu[SIZE][SIZE] = {{0, 0, 0},
                            {0, 0, 0},
                            {0, 0, 0}};

bool isLoShu();         // Prototype
```

Laboratory 07 – Part 2

```
int main()
{
	for (int i = 0; i < SIZE; i++)
		for (int j = 0; j < SIZE; j++)
		{
			cout << "Enter element for row " << i+1 << ", column " << j+1 << ": ";
			cin >> loShu[i][j];
		 }
	cout << (isLoShu() ? "It's a Lo Shu!" : "It's not a Lo Shu!") << endl;
	return 0;
}

bool isLoShu()
{
//  Your job is to write what goes into this function right here.
}
```

Laboratory 07 – Part 2

- If you are doing Laboratory07 synchronously, demonstrate your Lo Shu Magic Square Detector program to your instructor.
- If you are doing Laboratory07 asynchronously, then submit your Lo Shu Magic Square Detector program, *YourName*_Lab07.cpp, to Canvas.