

Magic Squares

One interesting application of two-dimensional arrays is magic squares. A magic square is a square matrix in which the sum of every row, every column, and both diagonals is the same. Magic squares have been studied for many years, and there are some particularly famous magic squares. In this exercise you will write code to determine whether a square is magic.

File `Square.java` contains the shell for a class that represents a square matrix. It contains headers for a constructor that gives the size of the square and methods to read values into the square, print the square, find the sum of a given row, find the sum of a given column, find the sum of the main (or other) diagonal, and determine whether the square is magic. The read method is given for you; you will need to write the others.

File `SquareTest.java` contains a program that reads input for squares from a file and tells whether each square is a magic square.

Run your program on file `magicData.txt`. You should find that the first, second, and third squares in the input are magic, and that the rest (fourth through seventh) are not. Note that the `-1` at the bottom of the test file tells the test program to stop reading.

After coding your own solution, compare it to the solution given on the web page.

The output for the first square read from file `magicData.txt` should be as follows:

```
Enter the name of the input file: magicData.txt

***** Square 1 *****
8      1      6
3      5      7
4      9      2

Row 0 sum = 15
Row 1 sum = 15
Row 2 sum = 15

Column 0 sum = 15
Column 1 sum = 15
Column 2 sum = 15

The sum of the main diagonal = 15
The sum of the other diagonal = 15
The Square IS a magic square.

Press enter to continue:
```