CSC331
Program 1

Assigned: 08/26/14 Due: 09/11/14

Purpose: Develop design techniques and implementation skills for two-dimensional arrays in C++.

Problem: Photos taken in space by the Galileo spacecraft are sent back to earth as a stream of numbers. Each number represents a level of brightness. A large digit (9) represents a low brightness level, and a small digit (0) represents a high level. Your job is to take a matrix of the numbers and print it as a picture.

One approach to generating a picture is to print a dark character (like $) when the brightness is low, and to print a light character (like a blank or period) when the level is high. Unfortunately, errors in transmission sometimes occur. Thus, your program should first attempt to find and correct these errors. Assume a value is in error if it differs by more than one from each of its four neighboring values. Correct the erroneous value by giving it the average of its neighboring values, rounded to the nearest integer. For example:

```
        5
    4   2   5      The 2 would be regarded as an error and would be
        5          given a correct value of 5.
```

Note that values on the corners or boundaries must utilize 2 or 3 neighbors respectively rather than 4. Your program should print out the uncorrected numbers and the uncorrected picture and the corrected numbers and corrected picture (processed left-to-right, top to bottom - 1 pass).

Example:

```
3 4 5 4 5 4 3 4    9 = &  1 = .          - ! + ! + ! - !    (uncorrected)
2 3 4 1 4 3 4 4    8 = $  0 = blank       , - !   ! - ! !
2 3 4 4 3 5 4 3    7 = #                  , - ! ! - + ! -
2 3 4 3 3 3 4 3    6 = *                  , - ! - -  - ! -
3 4 3 3 3 4 3 3    5 = +                  - ! - -  - ! - -
4 4 3 3 3 3 3 3    4 = !                  ! ! - - -  - - -
4 4 4 3 3 3 4 4    3 = -                  ! ! ! -  - - ! !
5 5 4 4 3 3 3 4    2 = ,                  + + ! ! - - - ,
```

Input: Read in the size of the square image, n, and each data line of digits (maximum 15).

Output: Output the original matrix of digits and picture and the corrected matrix and picture.

Data: Use the data file prog1.dat for input (on the cs server). The data file is located in the instructor's account (from your home directory the path is: **../instr/prog1.dat**).