

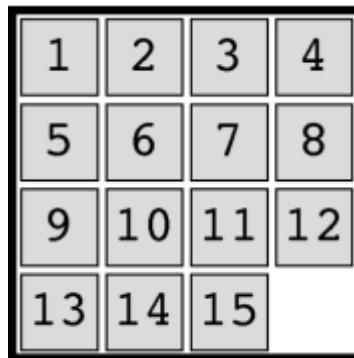
HW1: The Fifteen Puzzle

Due: 1:59PM, September 3. Submit your **source code only** through `dropbox@D2L`.

Total: 20 points.

In this assignment, you are going to implement the 15-puzzle or Game of Fifteen.

The 15-puzzle is a sliding puzzle played on a square, two-dimensional board with numbered tiles. The tiles are initially in random order with one tile missing. The goal of this puzzle is to arrange the board's tiles from smallest to largest, left to right, top to bottom, with an empty space in board's bottom-right corner, as in the below.

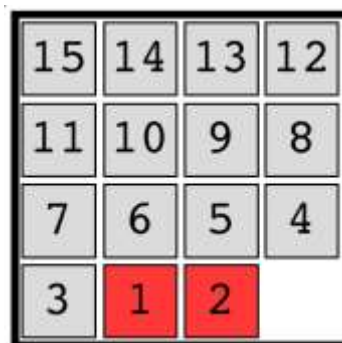


1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	

Figure 1: a solved 15-puzzle.

The tiles can only be slid, instead of being lifted, from one place that borders the board's empty space to the empty space. For example, although the configuration above depicts a game already won, only the tile numbered 12 or the tile numbered 15 could be slid into the empty space. None of the other tiles could be moved. Sliding any tile that borders the board's empty space in that space constitutes a "move."

While many initial configurations are solvable, we shall assume that this game begins with the board's tiles in reverse order, from largest to smallest, left to right, top to bottom, with an empty space in the board's bottom-right corner. If, however, and only if the board contains an odd number of tiles (i.e., the height and width of the board are even), the positions of tiles numbered 1 and 2 must be swapped, as in the below.



15	14	13	12
11	10	9	8
7	6	5	4
3	1	2	

Figure 2. an initial 15-puzzle

The source code FifteenGame.java, which can be downloaded from the course website, partially implements the 15-puzzle. The fully implemented FifteenGame.java should work the same as what you saw in the demo. For example, it generates the following outputs for the first several steps and the same pattern continues until the game is won.

```
[rge@telos cosc2100-fall2014]$ java FifteenGame 3
GAME OF FIFTEEN
 8 7 6
 5 4 3
 2 1 _
Tile to move: 3
 8 7 6
 5 4 _
 2 1 3
Tile to move: 6
 8 7 _
 5 4 6
 2 1 3
Tile to move: 7
 8 _ 7
 5 4 6
 2 1 3
Tile to move: 8
 _ 8 7
 5 4 6
 2 1 3
Tile to move:
```

You will complete three methods of class FifteenGame as follows.

1. (5pts) Method draw() that prints the board in its current state.
2. (5pts) Method move(int tile) that moves tile and returns true if tile borders empty space, else prompts a message of illegal move and returns false.
3. (5pts) Method won() that returns true if game is won, else false.

(5pts) You will reuse the provided main method without making any changes, comment your implementation, and format your code well.

Upload the complete **FifteenGame.java only** to dropbox@D2L before due time.