Assignment #2 – Java Minesweeper

Date assigned: Monday, January 13, 2020
Date due: Friday, January 17, 2020 by 1pm
Points: 50

The game minesweeper is a single-player game with the object of clearing a minefield without detonating a mine. The purpose of this assignment is to write a complete Java version of minesweeper in a project called **punetidMinesweeperJava**. The logic (and code) gained from this assignment will then be used to implement an Android version of minesweeper later in the course.

Details of the game can be found at: http://en.wikipedia.org/wiki/Minesweeper_(video_game)

Details of our Java game:

1. Set a constant to determine the dimension of our grid. Set the dimension to 9 initially giving us a grid of 9x9 or 81 squares.
2. Ask the user to input a difficulty level:
    a. EASY is 0
    b. MEDIUM is 1
    c. HARD is 2
3. Set the number of mines based on the difficulty level:
    a. EASY (specified by 0) is the dimension of our grid or 9.
    b. MEDIUM (specified by 1) is the dimension of our grid plus 1 times 3 which is 12.
    c. HARD (specified by 2) is the dimension of our grid plus 2 times 3 which is 15.
4. Some details of the game:
    a. Bombs are placed in random positions on the grid and identified with a value of @.
    b. During a turn, the user selects a cell to reveal the cell's contents
        i. A cell that has adjacent bombs is the only cell revealed and a number indicating the number of adjacent bombs is displayed in the cell the next time the grid is output.
        ii. A cell that has no adjacent bombs is marked with a SPACE. If a cell has no adjacent bombs, then all adjacent cells (including the diagonals) are looked at. For each of the adjacent cells, then either i. or ii. applies. Yes, this is a recursive definition although you do not need recursion to solve the problem. If you really want to understand recursion, then use it.
        iii. A cell selected by the user that has a bomb terminates the game
    c. If all non-bomb cells are identified with a value other than the initial value (a . in the following example) before a cell with a bomb is selected, then the user wins; otherwise, a bomb was hit and the user loses.

Here is an example of your game play.

```
**********
Minesweeper
**********

Enter difficulty level
(0 = EASY, 1 = MEDIUM, 2 = HARD): 0

  0   1   2   3   4   5   6   7   8

  .|  .|  .|  .|  .|  .|  .|  .|  .   0
---------------------------------
  .|  .|  .|  .|  .|  .|  .|  .|  @   1
---------------------------------
  .|  .|  .|  .|  .|  .|  .|  .|  .   2
---------------------------------
  .|  .|  .|  .|  .|  .|  .|  .|  .   3
---------------------------------
  .|  .|  .|  .|  .|  .|  .|  .|  .   4
---------------------------------
  @|  .|  .|  .|  .|  .|  .|  .|  .   5
---------------------------------
  .|  .|  .|  @|  @|  @|  .|  .|  .   6
---------------------------------
  .|  @|  .|  .|  .|  .|  .|  .|  .   7
---------------------------------
  @|  @|  .|  .|  .|  @|  .|  .|  .   8


Enter X and Y Coordinate: 3 8

  0   1   2   3   4   5   6   7   8

  .|  .|  .|  .|  .|  .|  .|  .|  .   0
---------------------------------
  .|  .|  .|  .|  .|  .|  .|  .|  @   1
---------------------------------
  .|  .|  .|  .|  .|  .|  .|  .|  .   2
---------------------------------
  .|  .|  .|  .|  .|  .|  .|  .|  .   3
---------------------------------
  .|  .|  .|  .|  .|  .|  .|  .|  .   4
---------------------------------
  @|  .|  .|  .|  .|  .|  .|  .|  .   5
---------------------------------
  .|  .|  .|  @|  @|  @|  .|  .|  .   6
---------------------------------
  .|  @|  3|  2|  4|  .|  .|  .|  .   7
---------------------------------
  @|  @|  2|   |  1|  @|  .|  .|  .   8
```

```
Enter X and Y Coordinate: 0 0

  0   1   2   3   4   5   6   7   8

   |   |   |   |   |   |   | 1|  .   0
---------------------------------
   |   |   |   |   |   |   | 1|  @   1
---------------------------------
   |   |   |   |   |   |   | 1|  1   2
---------------------------------
   |   |   |   |   |   |   |  |      3
---------------------------------
  1|  1|   |   |   |   |   |  |      4
---------------------------------
  @|  1|  1|  2|  3|  2|  1|  |      5
---------------------------------
  .|  .|  .|  @|  @|  @|  1|  |      6
---------------------------------
  .|  @|  3|  2|  4|  .|  2|  |      7
---------------------------------
  @|  @|  2|   |  1|  @|  1|  |      8


Enter X and Y Coordinate: 5 8
Boooom!!! You lose.
```

If the player wins, then display the message "Congratulations. You win."

Notes:

1. Make sure the user enters 0, 1, or 2 for the difficulty level. If an improper selection is made, display the input message again and continue until a proper response is entered.
2. Make sure the user enters a valid position on the Minesweeper board. If an invalid position is entered, display the input message again and continue until a valid position is entered.

Goals for Assignment #2:

1. Write a Java application using multiple classes
2. Use packages to better organize all classes
3. Use good OOP techniques in designing your solution. A good design will definitely use composition and inheritance
4. Use the Java API which has a rich library of routines (e.g. Vector, Stack)
5. Isolate all I/O in a game play object. You want both Java and Android versions of the game to be able to use the Minesweeper class.

Specifics:

1. Your project **punetidMinesweeperJava** and a single pdf, **punetid.pdf**, of all of your Java code is to be dropped into the CS260-01Drop folder on turing by the due date. Order the code by: 1) the main driver, 2) any classes that don't use composition or inheritance, 3) classes that use inheritance, and 4) classes that use composition.

2. If you come to me with a question regarding your solution, I will copy your solution from your accts folder on turing. I will not look at your code on your computer or on paper as it just takes me too long to get at the problem. Further, I want you to bring in your lecture notes in case I want you to look up something. Remember, I'm not just a tell you the answer guy. Make sure you understand how to use the developer tools especially the debugger.

3. If you want help with a compiler error, you must be able to tell me exactly what statement you put in your code that caused the error and be able to isolate the error. If you have typed in a bunch of code and have not tested your code as you've gone along, I'm not going to help you sort out the mess. You've been warned!!