CS-0401- First Exam

Instructor: Paulo Brasko
Term: Spring 2020
Week Day: Monday or Thursday (circle one)
Name: _____

The software company that you have been working for just got a new project. The customer is an airline company and you have been assigned to develop portions of code. The questions below are related to what the customer wants you to develop for them. Please avoid magic numbers when possible and create variable with meaningful names and using the Java naming convention (camelCaseNames).

Question #1: Write Java statements that create variables and assign sample values to them for the following parameters:

- Number of the passengers in an airplane flight
- A list of passenger names
- Flight id, such as AA-234
- An indicator if the flight is full or not
- Another indicator if the flight is on-time or not
- A list of available seats (e.g., 12A, 12B, 23D, 41E)

```
int numberOfPassengers = 300;
String[] listOfPassengers = {"John", "Mary", "Joanna"};
String flightId = "AA-234";
boolean isFlightFull = false;
boolean isFlightOnTime = true;
String[] availableSeats = { "12A", "12B", "41E" };
```

Question #2: Using the variables that you have created in Question #1, create a piece of code that prints the list of passengers in a similar way as shown below (all the lines below shall be printed by your application):

```
Banana Airlines Flight: <fight id here>
Total number of passengers: <value here>
Passenger Manifest:
     John Smith
     Mary Creda
     …
```

(note that there are few spaces before each passenger name in this printout. Please reproduce it in your implementation.)

```
System.out.println("Banana Airlines Flight: " + flightId);
System.out.println("Total number of passengers: " + listOfPassengers.length);
System.out.println("Passenger Manifest: ");
for (String passenger : listOfPassengers) {
    System.out.println("\t" + passenger);
}
```

Question #3: You are visiting Brazil and the temperature there is given in degree Celsius. Knowing that the temperature conversion from Celsius to Farenheight is:

```
Tf = 9/5 * Tc + 32
```

Create a **method** that converts a single temperature in degrees Celsius to Fahrenheit. After creating the method show how you would call this method from your main program and store its returning value into a variable.

```
// creating the method
private double convertTempInC(double tempInC) {
    // needs casting because of division by integers!!!
    return (double)9 / 5 * tempInC + 32;
}

// calling the method above
double tempInF = convertTempInC(70);
createConversionTable(10, 50);
```

Question #4: Instead of running your temperature converter all the time you are going for a walk in the Brazilian streets, you decided to create and print a table containing a number of temperatures in Celsius and Fahrenheit. Create a **method** that requires **two input arguments**: **minimum and maximum temperatures** in degrees Celsius and this method prints in the terminal window a table like the one shown below. You do not need to store these numbers in memory, just print them. **There must be 10 evenly spaced points in total** (you must calculate the delta temperature between each new temperature shown in the table below. In the table shown below, the delta is ~4.4, but it depends on the min and max temperature). Note the min and max values shown in the table below are just examples. Do not hard code them in your method. Note: you have already created a method that does one conversion. Call this method multiple times to create this table.

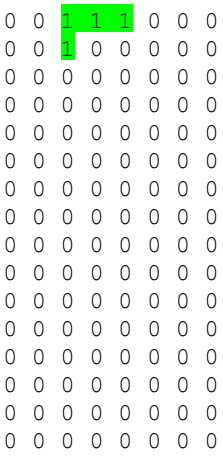
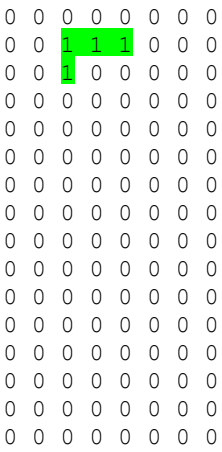
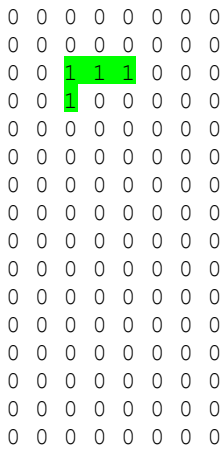
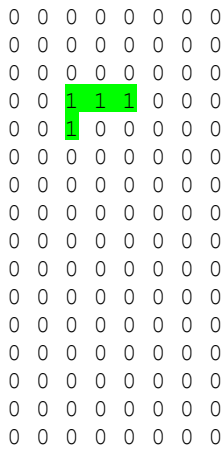
```
  Degree C   Degree F

    10.0       50.0
    14.4       58.0
    18.9       66.0
    23.3       74.0
    27.8       82.0
    32.2       90.0
    36.7       98.0
    41.1      106.0
    45.6      114.0
    50.0      122.0
```

```
// creating the method
private void createConversionTable(double minTc, double maxTc) {
   int numberOfIntervals = 9;
   double deltaTc = (maxTc - minTc) / numberOfIntervals;
   System.out.println("Temp in C    Temp in F");
   for (double currentTc = minTc; currentTc <= maxTc; currentTc += deltaTc) {
   System.out.println(currentTc + " " + convertTempInC(currentTc));
   }
}
```

Question #5: During the flight, the airline company also provides online games for the passenger, such as Tetris game. In this game a block appears at the top of a screen for each time step it goes one row down until it reaches the bottom of the screen (at least for the first block of the game).

a) Create a method that creates the initializes the game. I.e. a method that requires two inputs (number of rows and number of columns of the gameboard) and returns a 2D array representing the game board. This array must have initially all the locations set to zeros.
b) Create a method that creates an L shape representation ("1"s instead of "0"s) at the top of the game board as shown in "Time: 0" below.
c) Create a method that moves the L shape down one row for every time it is called by the main application.
d) Create a main application logic (not the whole program, but just with the necessary lines of code) such that:
    i) Calls the method defined on item a above with 16 rows and 8 columns
    ii) Calls the method defined on item b above
    iii) A loop that makes successive calls to the method defined on item c above. (Note: you can use the back of this page to finish your coding if needed)

Time: 0	Time: 1	Time: 2	Time: 3
			

```
// question a
private int[][] createGameBoard(int numberOfRows, int numberOfCols) {
   return new int[numberOfRows][numberOfCols];
}

// question b
private void createLShapeAtTheTop(int[][] gameBoard) {
   gameBoard[0][2] = 1;
   gameBoard[0][3] = 1;
   gameBoard[0][4] = 1;
   gameBoard[1][2] = 1;
}
```

```
// question c
private void moveLShape(int[][] gameBoard) {
   for (int row=gameBoard.length-2; row >= 0 ; row--) {
      for (int col=0; col < gameBoard[row].length; col++) {
         if (gameBoard[row][col] == 1) {
            gameBoard[row+1][col] = 1;
            gameBoard[row][col] = 0;
         }
      }
   }
}

// question d
int[][] gameBoard = createGameBoard(16, 8);
createLShapeAtTheTop(gameBoard);
printGameBoard(gameBoard);
for (int row = 0; row < 14; row++) {
   moveLShape(gameBoard);
   printGameBoard(gameBoard);
   Thread.sleep(1000);
}
```