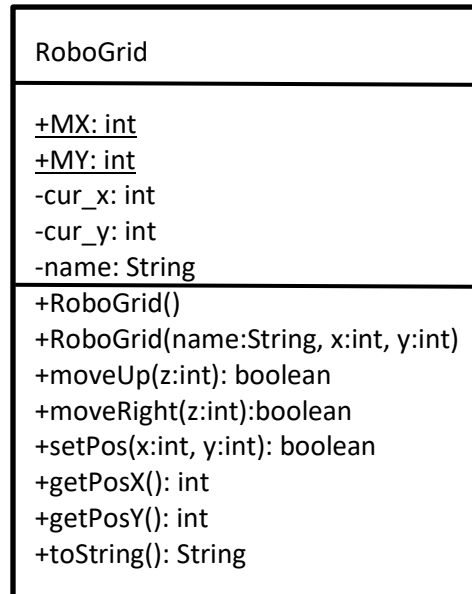
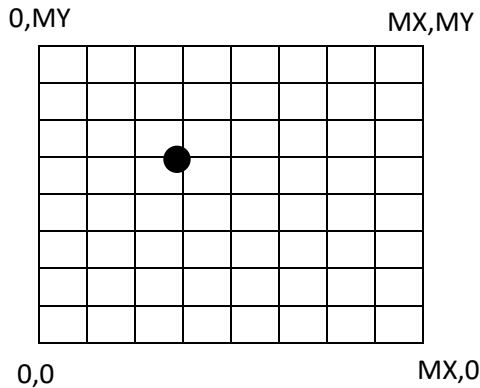


CSE 215 – Programming Language II, Section 2
Assignment 1, Full Marks – 50 (30 + 10 + 10), Due Date: 1 August 2021
Summer 2021

1. Suppose you need to design a Java Class to keep track of the movement of robots in a 2D grid as shown in the figure below. The UML diagram of the class is also given below where underlined attributes are static and capitalized attributes are final. MX and MY indicate the maximum distance a robot can move from (0,0) in the x and y directions; cur_x and cur_y attributes indicate x and y coordinates of the current position of a robot.



The values of MX and MY are fixed to 32. The no-arg constructor sets name to 'Nimo' and the current position at (0,0) and second constructor sets the name and current position at (x,y). The move methods move the position of a robot z unit in the respective directions. A robot can move out of the grid and such move instructions fail. When a move operation fails, the methods return false. For example, at position (MX,MY) a robot can't move right or up, it can only go down or in the left directions with negative value of z. When the robot can't move further, it stops at the boundary. For example, if a robot is at (30,30), moveUp(5) sets the position to (30,32). SetPos, getPosX and getPosY methods are self-explanatory, setPos method returns false when the position is out of range. The toString method return a string indicating the current position of the robot, i.e., "The robot-name is at (3,5)".

Now you need to do the following things.

- a. Define the class RoboGrid.
 - b. Declare two objects r1("Melissa", 5,30) and r2("Bob", 25, 10). Move r1 3 units right and r2 3 units up. Display the position of r1 and r2.
 - c. Overload the method moveRight(int z) with moveRight() that moves 1 unit to the right direction.
2. Write a Java method `int[] listOfFactors(int n)` that returns the list of factors of n. The numbers that divide a number, n, are called the factors of n. For example, when n = 10, the list of factors is {1,2,5,10}.
 3. Write a Java program that creates a 2D array of integers with 5 rows and random number of columns in each row (between 2 to 7). Initialize the array with some random numbers between 11 and 20. Now, display the sum of elements by column.