Project 5: ConnectX GUI

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Class: CPSC 2150/2151

User Story:

Functional Requirements:

1. As a user, I select up to 10 players.
2. As a user, I can choose to have up to 20 rows and minimum of 3 rows
3. As a user, I can choose to have up to 20 columns and minimum of 3 columns.
4. As a user, I can start from any number of given columns.
5. As a user, my player token can only start from the bottom row.
6. As a user, my player token can be any character from these tokens: 'X', 'O', 'E', 'H', 'Y', 'A', 'P', 'U', 'J', 'M' .
7. As a user, I can choose to have up to 10 in a row to win but it cannot be more or less than columns or rows.
8. As a user, I can try to stop other player winning by placing the token in the columns.
9. As a user, I can win if I can get the number of given place tokens in a row.
10. As a user If I win, the game will exit with the congratulatory message and I can press any button to restart the game or close the window if I chose not to play.
11. As a user if the game ties , the game will exit with the congratulatory message and I can press any button to restart the game or close the window if I chose not to play.
12. As a user, if I opted in to play again than I should start as any number of player and any player character.
13. As a user, if I place a place token outside the bounds it will give me an error and it will ask me to choose it again.
14. As a user, if I place a place token other than mine it will give me an error and it will ask me to choose it again.
15. As a user, if I place a token at a filled space, it will give me an error and prompt me to rechoose it.
16. As a user, if I put a token in a column(s) that is/are already full, it will inform me an error and ask me to choose again.
17. As a user if I don't have any free space than game will be tie.

Non-Functional Requirements:

1. The program is written in Java.
2. The program can run on Unix but prefer to run on MacOS or Windows.

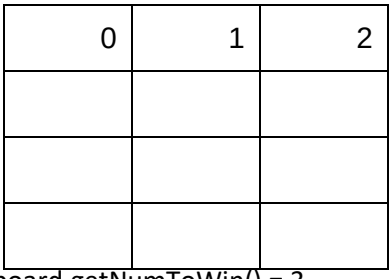
3. The program runs on IntelliJ.
4. The number of tokens to win are between 3 and 20 inclusive.
5. The number of rows is between 3 and 20 inclusive.
6. The number of columns is between 3 and 20 inclusive.
7. The number of players is between 2 and 10 inclusive.
8. Player 1 always goes first as 'X'.
9. 0,0 is the bottom left of the board.

Deployment:

1. To compile my program, you can simply "run" the program inside IntelliJ.

Test Cases for GameBoard/GameBoardMem

Gameboard(int r, int c, int w)

Input r = 3 c =3 w = 3	Output State:  board.getNumToWin() = 3	Reasoning: This test case is distinct because it tests if the constructor can make the smallest possible board Name: test_Constructor_smallest

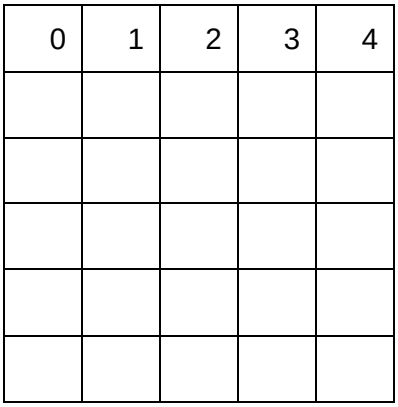
Gameboard(int r, int c, int w)

Input r = 100 c = 100 w = 25	Output State: Board = 100 X 100 board.getNumToWin() = 25	Reasoning: This test case is distinct because it tests if the constructor can make the biggest possible board Name: test_Constructor_biggest

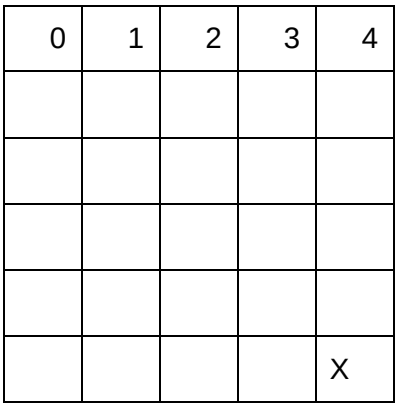
Gameboard(int r, int c, int w)

Input r = 30 c = 20 w = 3	Output State: Board = 30 X 20 board.getNumToWin() = 3	Reasoning: This test case is distinct because it tests if the constructor can make a board with unequal rows and columns Name: test_Constructor_different

boolean checkIfFree(int c)

Input State:	Output checkIfFree(2) = true	Reasoning:
	Board is unchanged	This test case is distinct because it represents a standard test of a free column Function name: test_CheckIfFree_empty

boolean checkIfFree(int c)

Input State:	Output checkIfFree(4) = true	Reasoning:
	Board is unchanged	This test case is distinct because it represents a standard test of a column that has tokens in it Function name: test_CheckIfFree_one_space

boolean checkIfFree(int c)

<table>
<tr>
<td>Input State:

<table>
<tr><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td></tr>
<tr><td></td><td></td><td></td><td></td><td>X</td></tr>
<tr><td></td><td></td><td></td><td></td><td>X</td></tr>
<tr><td></td><td></td><td></td><td></td><td>X</td></tr>
<tr><td></td><td></td><td></td><td></td><td>X</td></tr>
<tr><td></td><td></td><td></td><td></td><td>X</td></tr>
</table>
</td>
<td>Output checkIfFree(4) = false

Board is unchanged</td>
<td>Reasoning:

This test case is distinct because it represents a standard test of a column that isn’t free

Function name:
test_CheckIfFree_full</td>
</tr>
</table>

boolean checkHorizWin(BoardPosition pos, char p)

Input State:	Output	Reasoning:
<table><tr><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr></table> pos = (2, 2) p = 'X' board.checkNumToWin() = 3	checkHorizWin(pos, p) = false Board is unchanged	This test case is distinct because it represents a standard test of there being no horizontal win Function name: test_CheckHorizontalWin_emp ty

boolean checkHorizWin(BoardPosition pos, char p)

Input State:	Output	Reasoning:
<table><tr><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td>X</td><td>X</td><td>X</td><td></td><td></td></tr></table> board.getNumToWin() = 3 Pos = (2, 2) P = 'X'	checkHorizWin(pos, p) = true Board is unchanged	This test case is distinct because it represents a standard test of conditions being fulfilled for a horizontal win Function name: test_CheckHorizontalWin_just _enough

boolean checkHorizWin(BoardPosition pos, char p)

Input State:	Output	Reasoning:
<table><tr><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td>X</td><td>X</td><td>X</td><td>X</td><td></td></tr></table> board.getNumToWin() = 3 Pos = (2,2) P = 'X'	checkHorizWin(pos, p) = true Board is unchanged	This test case is distinct because it tests to make sure more than the specified amount will result in a win Function name: test_CheckHorizontalWin_more_than_enough

boolean checkHorizWin(BoardPosition pos, char p)

Input State:	Output checkHorizWin(pos, p) = false Board is unchanged	Reasoning: This test case is distinct because it tests to make sure the function checks the tokens in a row are the same Function name: test_CheckHorizontalWin_just_not_enough
<table><tr><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td>X</td><td>X</td><td>O</td><td>X</td><td></td></tr></table> board.getNumToWin() = 3 Pos = (2,2) P = 'X'		

boolean checkVertWin(BoardPosition pos, char p)

Input State:	Output	Reasoning:
<table><tr><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr></table> board.getNumToWin() = 3 Pos = (2,2) P = 'X'	checkVertWin(pos, p) = false Board is unchanged	This test case is distinct because it represents a standard case of there being no vertical win Function name: test_CheckVerticalWin_empty

boolean checkVertWin(BoardPosition pos, char p)

Input State:	Output	Reasoning:
<table><tr><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td>X</td><td></td><td></td></tr><tr><td></td><td></td><td>X</td><td></td><td></td></tr><tr><td></td><td></td><td>X</td><td></td><td></td></tr></table> board.getNumToWin() = 3 Pos = (2,2) P = 'X'	checkVertWin(pos, p) = true Board is unchanged	This test case is distinct because it represents a standard case of there being a vertical win Function name: test_CheckVerticalWin_just_enough

boolean checkVertWin(BoardPosition pos, char p)

Input State:	Output	Reasoning:
<table><tr><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td>X</td><td></td><td></td></tr><tr><td></td><td></td><td>X</td><td></td><td></td></tr><tr><td></td><td></td><td>X</td><td></td><td></td></tr><tr><td></td><td></td><td>X</td><td></td><td></td></tr></table> board.getNumToWin() = 3 Pos = (2,2) P = 'X'	checkVertWin(pos, p) = true Board is unchanged	This test case is distinct because it represents a case where there is more than enough for a vertical win Function name: test_CheckVerticalWin_more_than_enough

boolean checkVertWin(BoardPosition pos, char p)

Input State:	Output	Reasoning:
<table><tr><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td>X</td><td></td><td></td></tr><tr><td></td><td></td><td>O</td><td></td><td></td></tr><tr><td></td><td></td><td>X</td><td></td><td></td></tr><tr><td></td><td></td><td>X</td><td></td><td></td></tr></table> board.getNumToWin() = 3 Pos = (2,2) P = 'X'	checkVertWin(pos, p) = false Board is unchanged	This test case is distinct because it represents a case where the function checks to make sure the tokens in a row are the same Function name: test_CheckVerticalWin_just_not_enough

boolean checkDiagWin(BoardPosition pos, char p)

Input State:	Output	Reasoning:
<table><tr><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr></table> board.getNumToWin() = 3 Pos = (0,0) P = 'X'	checkDiagWin(pos, p) = false Board is unchanged	This test case is distinct because it represents a standard case of there being no diagonal win Function name: test_CheckDiagonalWin_empt y

boolean checkDiagWin(BoardPosition pos, char p)

Input State:	Output	Reasoning:
<table><tr><td>0</td><td>1</td><td>2</td><td>3</td></tr><tr><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td>X</td><td></td></tr><tr><td>O</td><td>X</td><td>X</td><td></td></tr><tr><td>X</td><td>O</td><td>O</td><td></td></tr></table> board.getNumToWin() = 3 Pos = (2, 2) P = 'X'	checkDiagWin(pos, p) = true Board state is unchanged	This test case is distinct because it represent the standard case of there being a diagonal win that starts from the left Function name: test_CheckDiagonalWin_left_j ust_enough

boolean checkDiagWin(BoardPosition pos, char p)

Input State:	Output	Reasoning:
<table><tr><td>0</td><td>1</td><td>2</td><td>3</td></tr><tr><td></td><td></td><td></td><td>X</td></tr><tr><td></td><td></td><td>X</td><td>X</td></tr><tr><td>O</td><td>X</td><td>X</td><td>O</td></tr><tr><td>X</td><td>O</td><td>O</td><td>X</td></tr></table> board.getNumToWin() = 3 Pos = (2, 2) P = 'X'	checkDiagWin(pos, p) = true Board state is unchanged	This test case is distinct because it represents the case where there is more than enough for a diagonal win that starts to the left Function name: test_CheckDiagonalWin_left_more_than_enough

boolean checkDiagWin(BoardPosition pos, char p)

Input State:	Output	Reasoning:
<table><tr><td>0</td><td>1</td><td>2</td><td>3</td></tr><tr><td></td><td></td><td></td><td>O</td></tr><tr><td></td><td></td><td>O</td><td>X</td></tr><tr><td>O</td><td>X</td><td>X</td><td>O</td></tr><tr><td>X</td><td>O</td><td>O</td><td>X</td></tr></table> board.getNumToWin() = 3 Pos = (2, 2) P = 'X'	checkDiagWin(pos, p) = false Board state is unchanged	This test case is distinct because it represents the case where the function checks that the tokens in a row are the same, for a diagonal that starts at the left Function name: test_CheckDiagonalWin_left_just_not_enough

boolean checkDiagWin(BoardPosition pos, char p)

<table>
<tr>
<td>Input State:

<table>
<tr><td>0</td><td>1</td><td>2</td><td>3</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td>X</td><td></td><td></td></tr>
<tr><td></td><td>O</td><td>X</td><td></td></tr>
<tr><td></td><td>O</td><td>O</td><td>X</td></tr>
</table>
board.getNumToWin() = 3

Pos = (2, 2) P = ‘X’</td>
<td>Output

checkDiagWin(pos, p) = true
Board state is unchanged</td>
<td>Reasoning:

This test case is distinct because it represents the basic case where there is a diagonal win that starts to the right

Function name: test_CheckDiagonalWin_right_just_enough</td>
</tr>
</table>

boolean checkDiagWin(BoardPosition pos, char p)

Input State:	Output	Reasoning:
<table><tr><td>0</td><td>1</td><td>2</td><td>3</td></tr><tr><td>X</td><td></td><td></td><td></td></tr><tr><td>X</td><td>X</td><td></td><td></td></tr><tr><td>O</td><td>O</td><td>X</td><td></td></tr><tr><td>X</td><td>O</td><td>O</td><td>X</td></tr></table> board.getNumToWin() = 3 Pos = (2, 2) P = 'X'	checkDiagWin(pos, p) = true Board state is unchanged	This test case is distinct because it represents the case where there is a diagonal win that starts to the right when there is more than enough tokens in a row Function name: test_CheckDiagonalWin_right_more_than_enough

boolean checkDiagWin(BoardPosition pos, char p)

Input State:	Output	Reasoning:
<table><tr><td>0</td><td>1</td><td>2</td><td>3</td></tr><tr><td>O</td><td></td><td></td><td></td></tr><tr><td>X</td><td>X</td><td></td><td></td></tr><tr><td>O</td><td>O</td><td>X</td><td></td></tr><tr><td>X</td><td>O</td><td>O</td><td>X</td></tr></table> board.getNumToWin() = 3 Pos = (2, 2) P = 'X'	checkDiagWin(pos, p) = false Board state is unchanged	This test case is distinct because it represents the case where the function checks to make sure a diagonal starting from the right has equivalent tokens in a row Function name: test_CheckDiagonalWin_right_just_not_enough

boolean CheckTie()

Input State:	Output CheckTie() = false	Reasoning:
<table><tr><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr></table>	Board is unchanged	This test case is distinct because it represents the standard case of there being no tie Function name: test_CheckTie_empty

boolean CheckTie()

Input State:	Output CheckTie() = true	Reasoning:
<table><tr><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td>X</td><td>X</td><td>X</td><td>X</td><td>X</td></tr><tr><td>X</td><td>X</td><td>X</td><td>X</td><td>X</td></tr><tr><td>X</td><td>X</td><td>X</td><td>X</td><td>X</td></tr><tr><td>X</td><td>X</td><td>X</td><td>X</td><td>X</td></tr><tr><td>X</td><td>X</td><td>X</td><td>X</td><td>X</td></tr></table>	Board is unchanged	This test case is distinct because it represents the standard case of there being a tie Function name: test_CheckTie_full

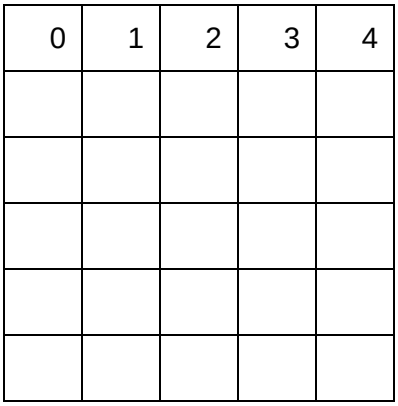
boolean CheckTie()

Input State:	Output CheckTie() = false	Reasoning:
<table><tr><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td>X</td><td>X</td><td>X</td><td>X</td><td></td></tr><tr><td>X</td><td>X</td><td>X</td><td>X</td><td></td></tr><tr><td>X</td><td>X</td><td>X</td><td>X</td><td></td></tr><tr><td>X</td><td>X</td><td>X</td><td>X</td><td></td></tr><tr><td>X</td><td>X</td><td>X</td><td>X</td><td></td></tr></table>	Board is unchanged	This test case is distinct because it ensures that the function checks every column Function name: test_CheckTie_almost_full

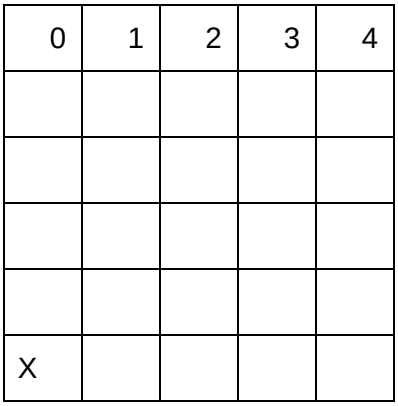
boolean CheckTie()

Input State:	Output CheckTie() = false	Reasoning:
<table><tr><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td>X</td><td>X</td><td>X</td><td>X</td><td></td></tr><tr><td>X</td><td>X</td><td>X</td><td>X</td><td>X</td></tr><tr><td>X</td><td>X</td><td>X</td><td>X</td><td>X</td></tr><tr><td>X</td><td>X</td><td>X</td><td>X</td><td>X</td></tr><tr><td>X</td><td>X</td><td>X</td><td>X</td><td>X</td></tr></table>	Board is unchanged	This test case is distinct because it ensures that the function checks every space on the board Function name: test_CheckTie_all_but_one

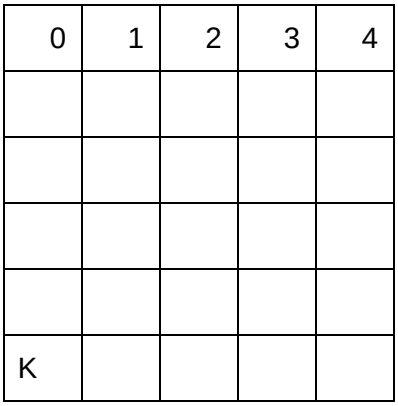
char whatsAtPos(BoardPosition pos)

Input State:	Output whatsAtPos(pos) = ‘ ‘	Reasoning:
 Pos = (0,0)	Board is unchanged	This test case is distinct because it represents the standard case of no character being on the position Function name: test_WhatsAtPos_empty

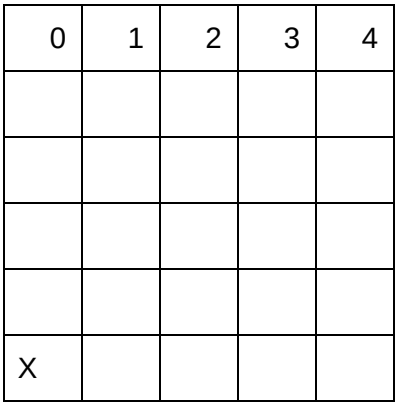
char whatsAtPos(BoardPosition pos)

Input State:	Output whatsAtPos(pos) = ‘X ‘	Reasoning:
 Pos = (0,0)	Board is unchanged	This test case is distinct because it represents the standard case of a character being on the position Function name: test_WhatsAtPos_player_x

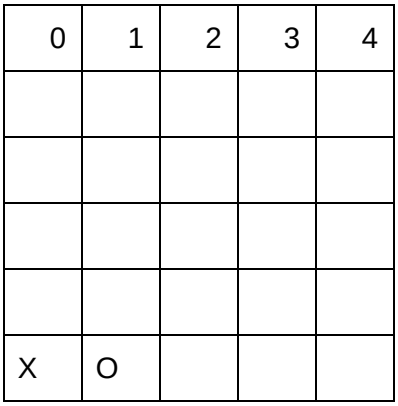
char whatsAtPos(BoardPosition pos)

Input State:	Output whatsAtPos(pos) = 'E'	Reasoning:
 Pos = (0,0)	Board is unchanged	This test case is distinct because it ensures the function recognizes characters that aren't X or O Function name: test_WhatsAtPos_player_K

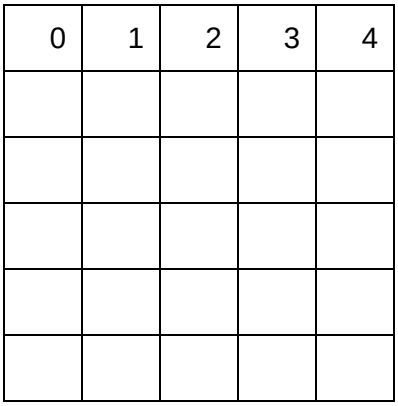
char whatsAtPos(BoardPosition pos)

Input State:	Output whatsAtPos(pos) = ' '	Reasoning:
 Pos = (0,1)	Board is unchanged	This test case is distinct because it ensures the function is checking the correct position Function name: test_WhatsAtPos_player_near by

char whatsAtPos(BoardPosition pos)

Input State:	Output whatsAtPos(pos) = 'O'	Reasoning:
 Pos = (0,1)	Board is unchanged	This test case is distinct because it ensures the function will return the correct character Function name: test_WhatsAtPos_two_players

boolean isPlayerAtPos(BoardPosition pos, char p)

Input State:	Output isPlayerAtPos = false	Reasoning:
 Pos = (0,0) P = 'X'	Board is unchanged	This test case is distinct because it represents the standard case of no character being on the position Function name: test_IsPlayerAtPos_empty

boolean isPlayerAtPos(BoardPosition pos, char p)

Input State:	Output	Reasoning:
<table><tr><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td>X</td><td></td><td></td><td></td><td></td></tr></table> Pos = (0,0) P = 'X'	isPlayerAtPos(pos, p) = true Board is unchanged	This test case is distinct because it represents the standard case of a character being on the position Function name: test_IsPlayerAtPos_player_x

boolean isPlayerAtPos(BoardPosition pos, char p)

Input State:	Output	Reasoning:
<table><tr><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td>K</td><td></td><td></td><td></td><td></td></tr></table> Pos = (0,0) P = 'E'	isPlayerAtPos(pos, p) = true Board is unchanged	This test case is distinct because it ensures the function recognizes characters that aren't X and O Function name: test_IsPlayerAtPos_player_K

boolean isPlayerAtPos(BoardPosition pos, char p)

Input State:	Output	Reasoning:
<table><tr><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td>X</td><td></td><td></td><td></td><td></td></tr></table> Pos = (0,1) P = 'X'	isPlayerAtPos(pos, p) = false Board is unchanged	This test case is distinct because it ensures that the function checks the correct position Function name: test_IsPlayerAtPos_empty_space_nearby

boolean isPlayerAtPos(BoardPosition pos, char p)

Input State:	Output	Reasoning:
<table><tr><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td>X</td><td>O</td><td></td><td></td><td></td></tr></table> Pos = (0,1) P = 'O'	isPlayerAtPos(pos, p) = true Board is unchanged	This test case is distinct because it ensures the function is looking for the correct character Function name: test_IsPlayerAtPos_two_players

Void placeToken(char p, int c)

Input

0	1	2	3	4

Output

0	1	2	3	4
X				

Reasoning:

This test case is distinct because it is testing if the function can add a token to the first available column

Function name:
test_PlaceToken_bottom_left

Void placeToken(char p, int c)

Input

0	1	2	3	4

Output

0	1	2	3	4
				X

Reasoning:

This test case is distinct because it is testing if the function can add a token to the last available column

Function name:
test_PlaceToken_bottom_right

Void placeToken(char p, int c)

Input

0	1	2	3	4

Output

0	1	2	3	4
X	X	X	X	X
X	X	X	X	X
X	X	X	X	X
X	X	X	X	X
X	X	X	X	X

Reasoning:

This test case is distinct because it is testing if the function can add many tokens over and over again

Function name: test_PlaceToken_fill_board

Void placeToken(char p, int c)

Input

0	1	2	3	4

Output

0	1	2	3	4
X	O			

Reasoning:

This test case is distinct because it is testing if the function can add different tokens

Function name: test_PlaceToken_different_characters

Void placeToken(char p, int c)

Input

0	1	2	3	4

Output

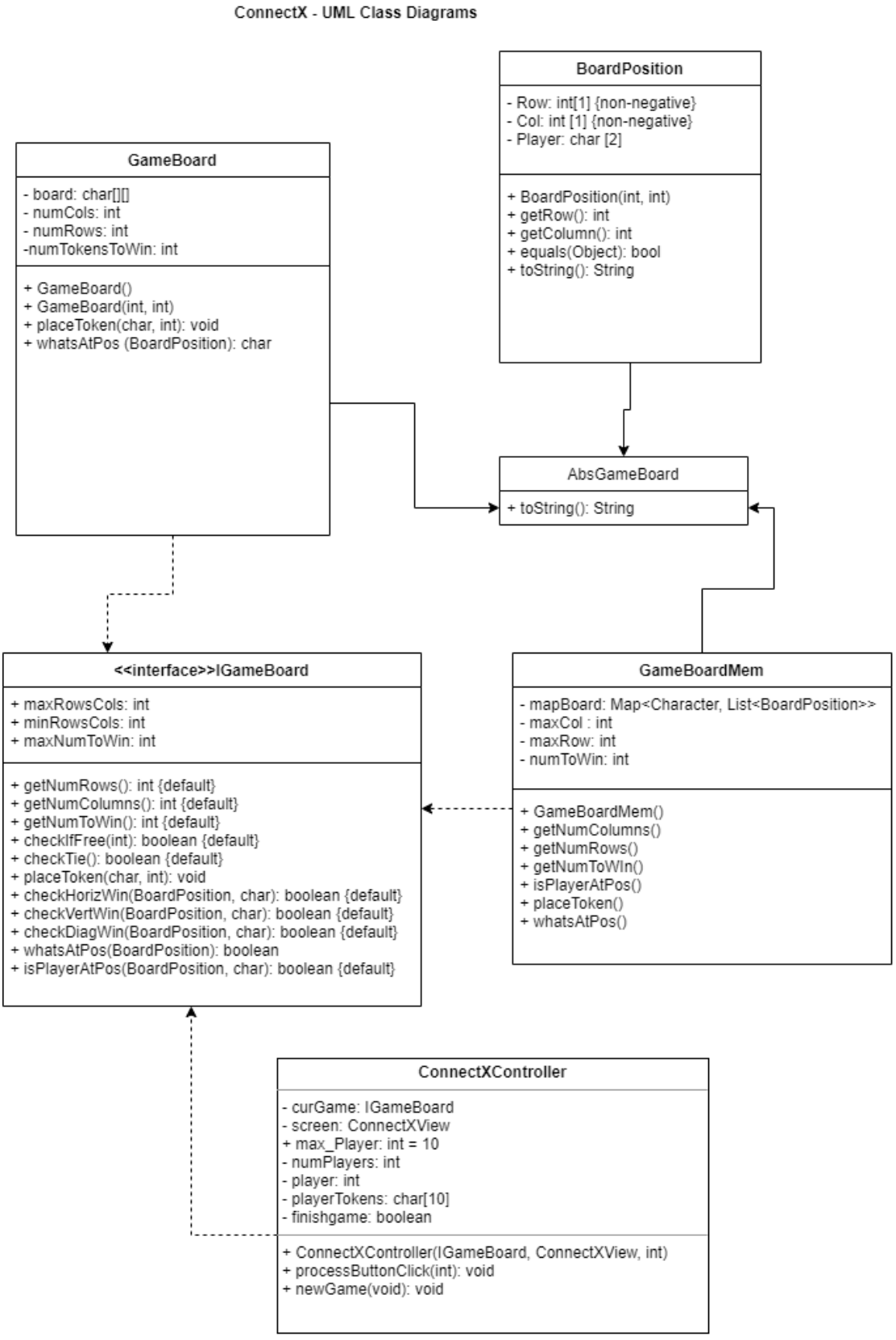
0	1	2	3	4
S	H	R	E	K
S	H	R	E	K
S	H	R	E	K
S	H	R	E	K
S	H	R	E	K

Reasoning:

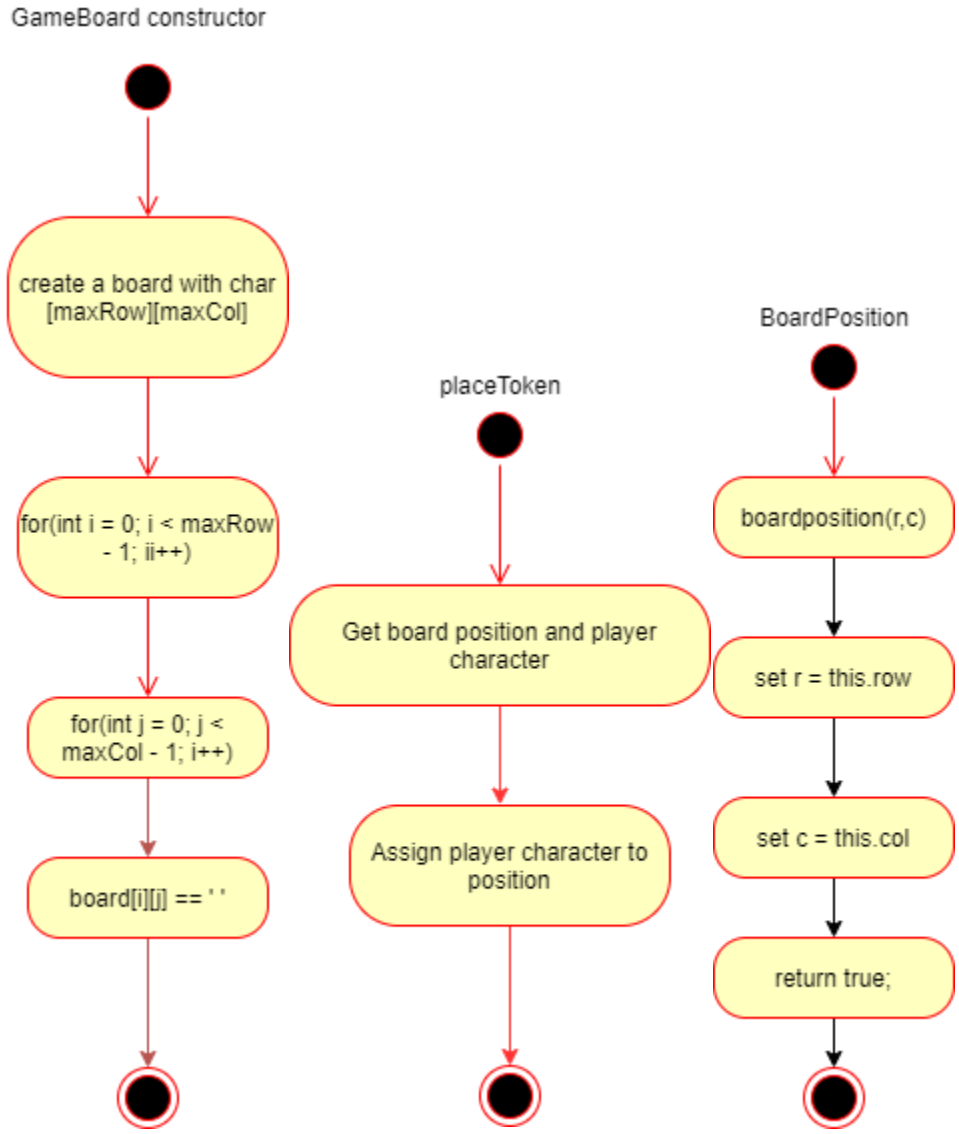
This test case is distinct because it is testing if the function can add characters in a pattern

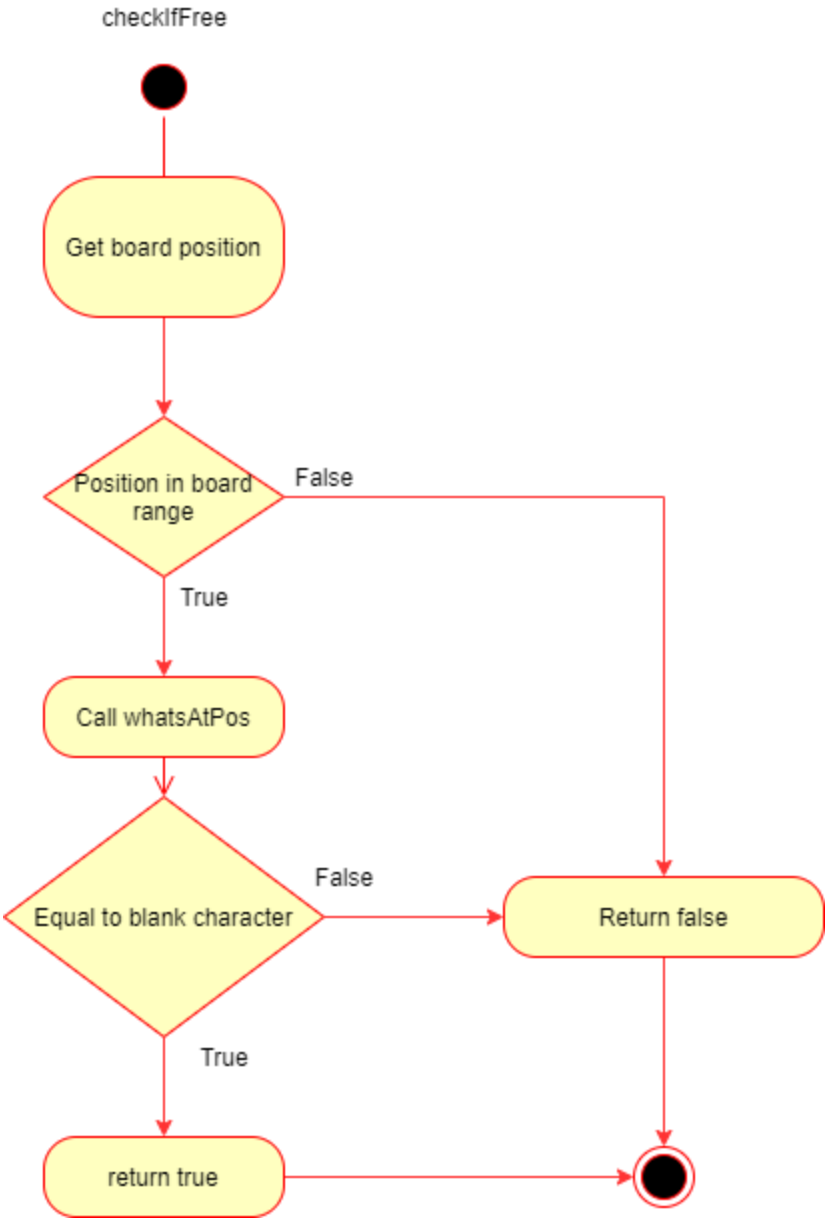
Function name: test_PlaceToken_fill_different_characters

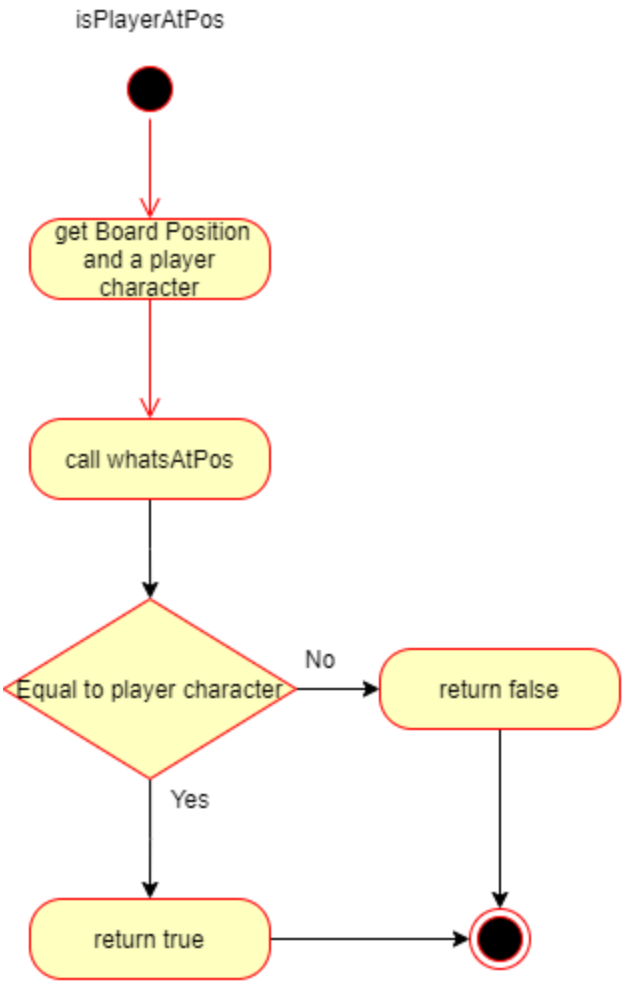
UML Class Diagrams

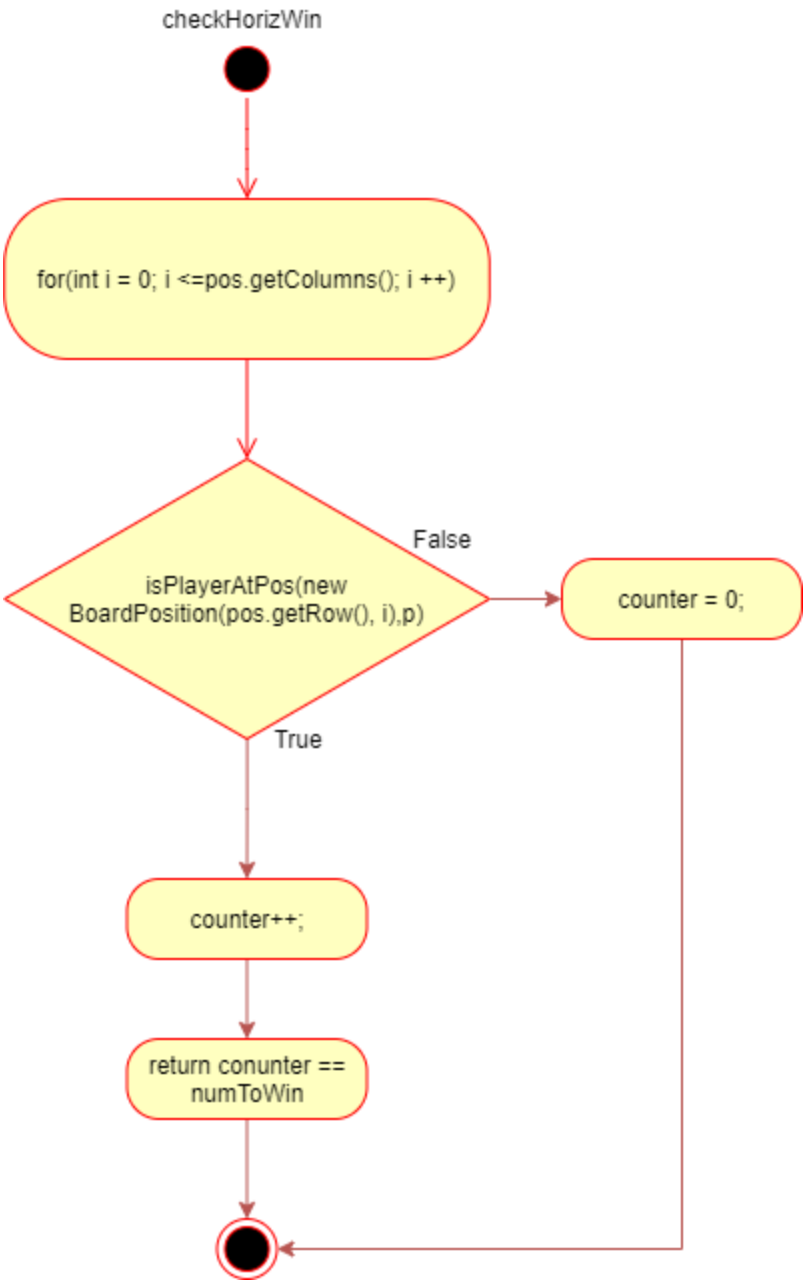


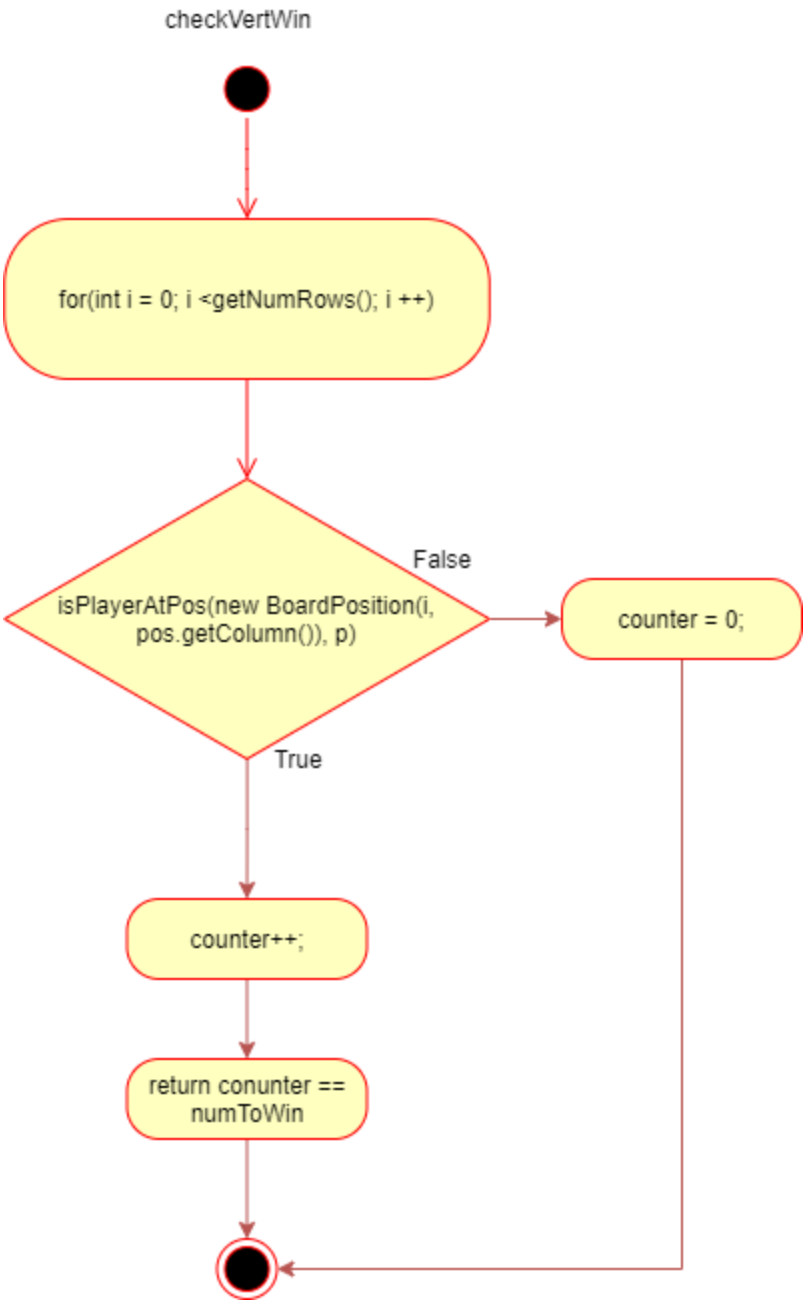
UML Activity Diagrams

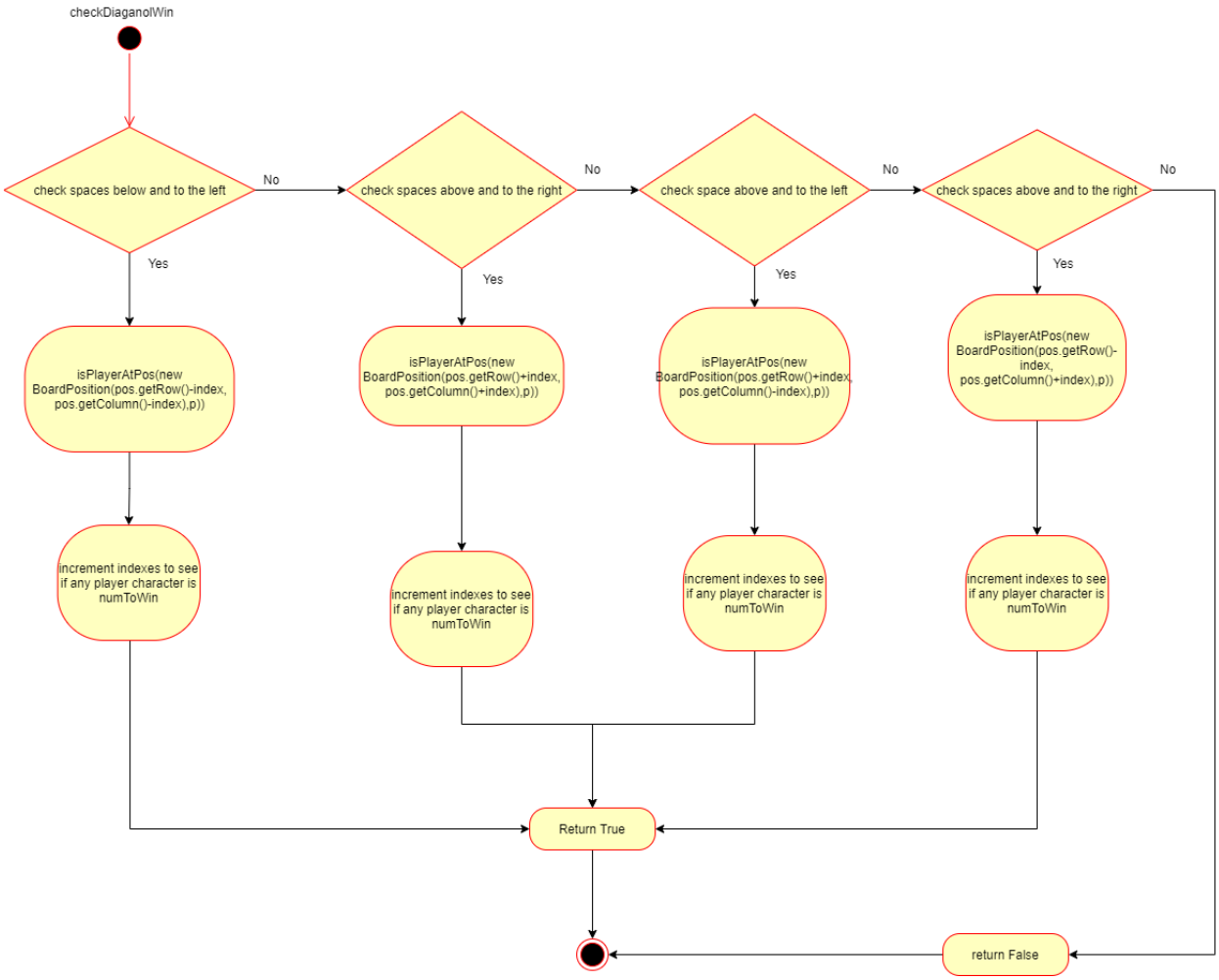


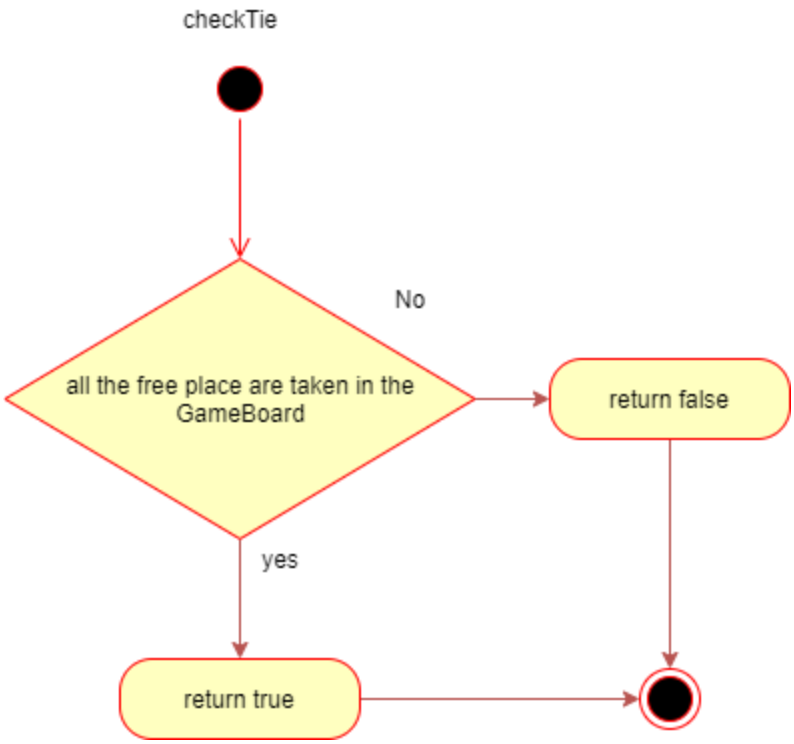

checkIfFree
Get board position
Position in board range
False
True
Call whatsAtPos
Equal to blank character
False
Return false
True
return true

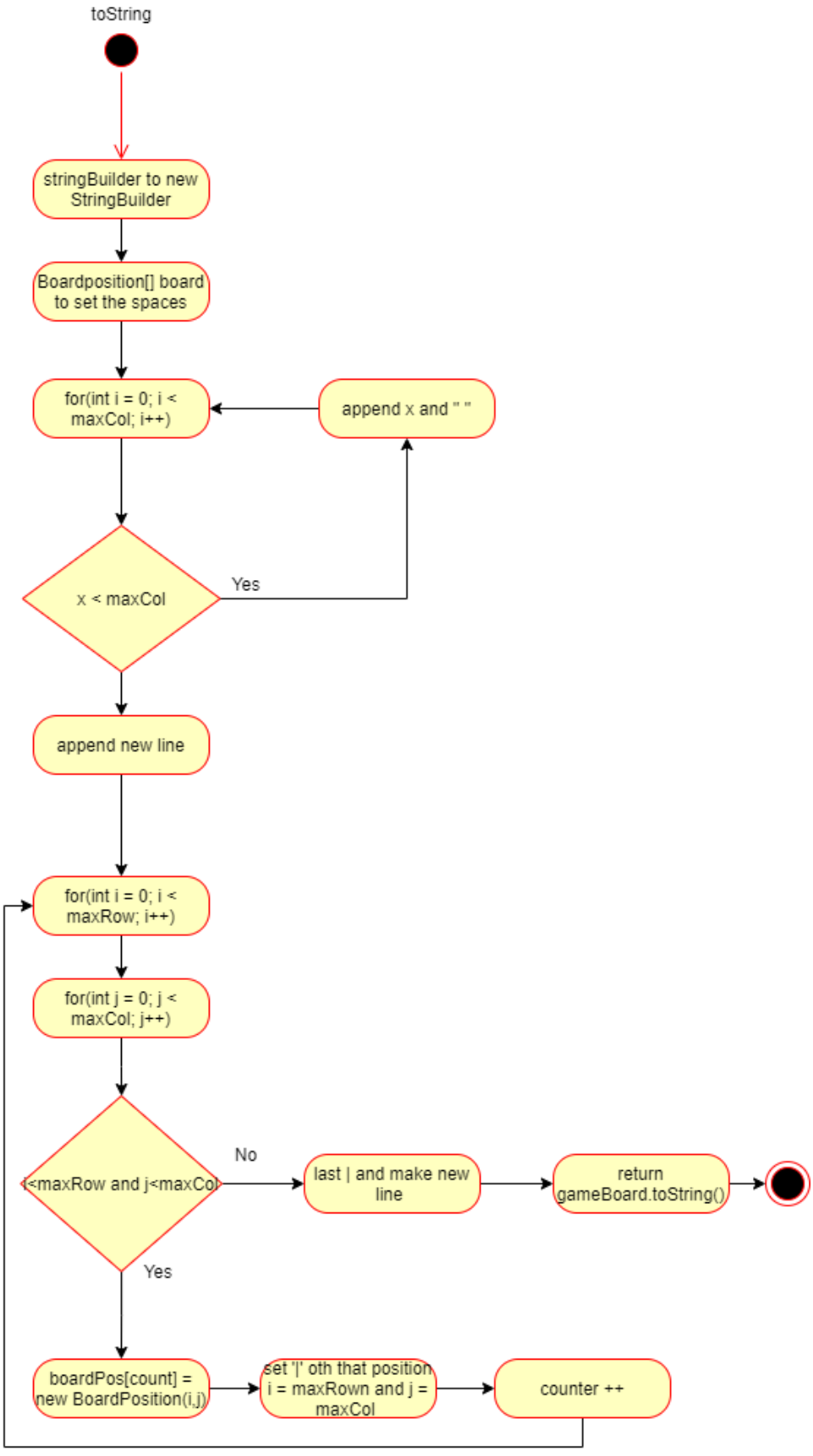

isPlayerAtPos
get Board Position and a player character
call whatsAtPos
Equal to player character
No
return false
Yes
return true

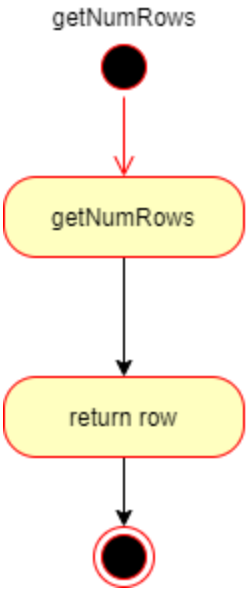

checkHorizWin
for(int i = 0; i <=pos.getColumns(); i ++)
isPlayerAtPos(new BoardPosition(pos.getRow(), i),p)
False
True
counter = 0;
counter++;
return conunter == numToWin

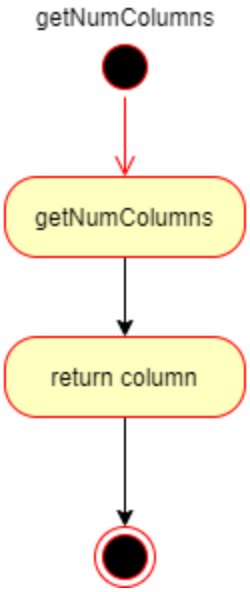

checkVertWin
for(int i = 0; i <getNumRows(); i ++)
isPlayerAtPos(new BoardPosition(i, pos.getColumn()), p)
False
True
counter = 0;
counter++;
return conunter == numToWin

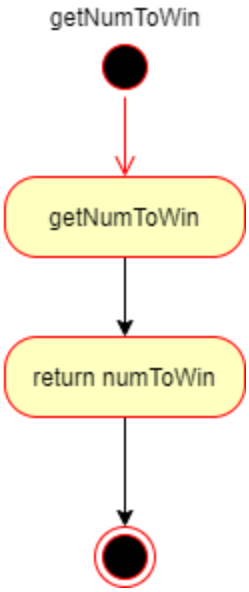

checkDiaganolWin
check spaces below and to the left
No
check spaces above and to the right
No
check space above and to the left
No
check spaces above and to the right
No
Yes
Yes
Yes
Yes
isPlayerAtPos(new BoardPosition(pos.getRow()-index, pos.getColumn()-index),p))
isPlayerAtPos(new BoardPosition(pos.getRow()+index, pos.getColumn()+index),p))
isPlayerAtPos(new BoardPosition(pos.getRow()+index, pos.getColumn()-index),p))
isPlayerAtPos(new BoardPosition(pos.getRow()-index, pos.getColumn()+index),p))
increment indexes to see if any player character is numToWin
increment indexes to see if any player character is numToWin
increment indexes to see if any player character is numToWin
increment indexes to see if any player character is numToWin
Return True
return False

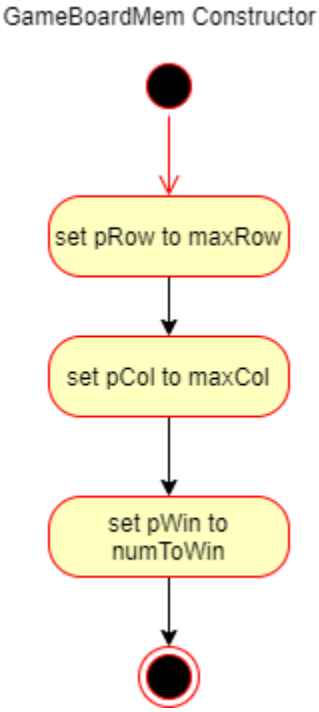

checkTie
all the free place are taken in the GameBoard
No
return false
yes
return true

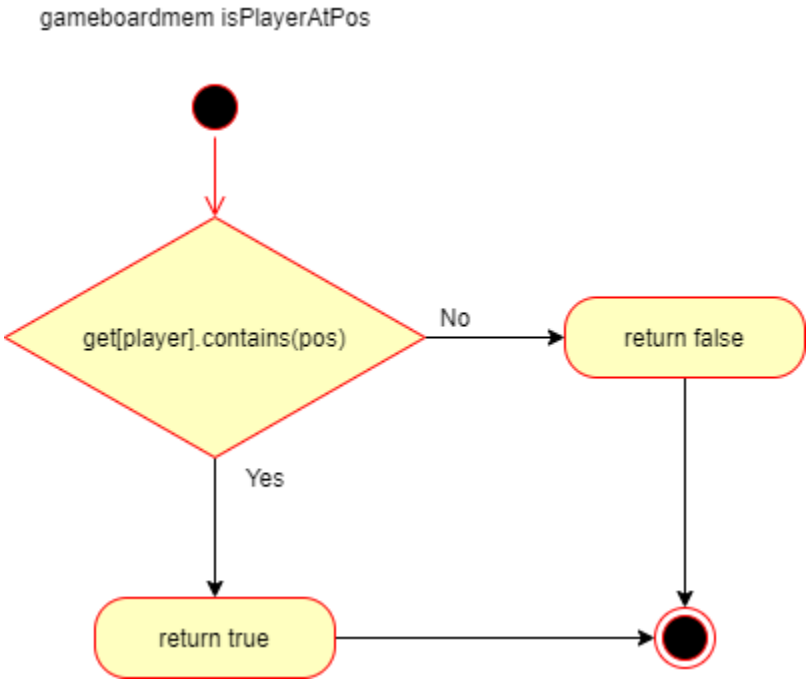

toString
stringBuilder to new StringBuilder
Boardposition[] board to set the spaces
for(int i = 0; i < maxCol; i++)
append x and " "
x < maxCol
Yes
append new line
for(int i = 0; i < maxRow; i++)
for(int j = 0; j < maxCol; j++)
i<maxRow and j<maxCol
No
last | and make new line
return gameBoard.toString()
Yes
boardPos[count] = new BoardPosition(i,j)
set '|' oth that position i = maxRown and j = maxCol
counter ++

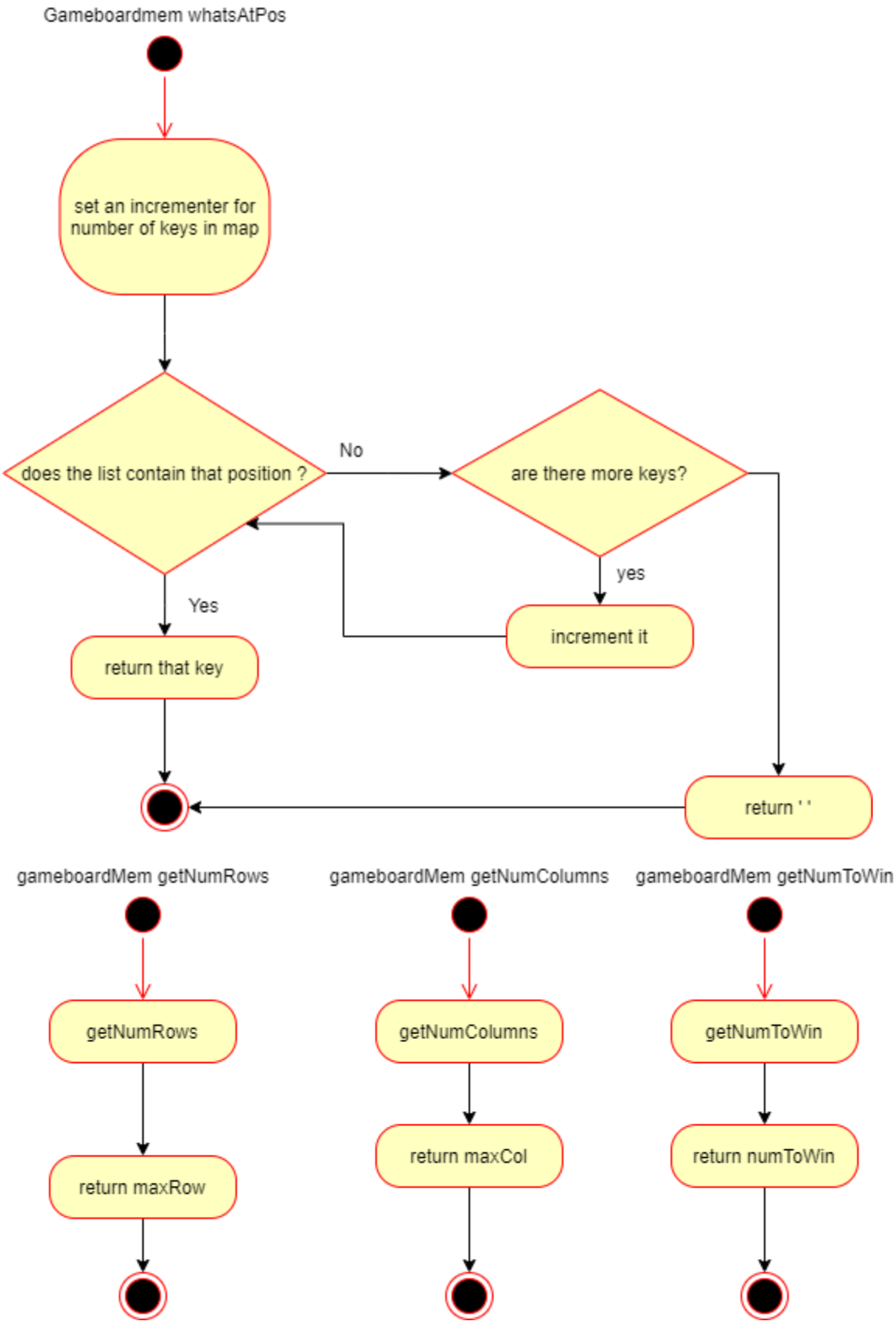

getNumRows
getNumRows
return row

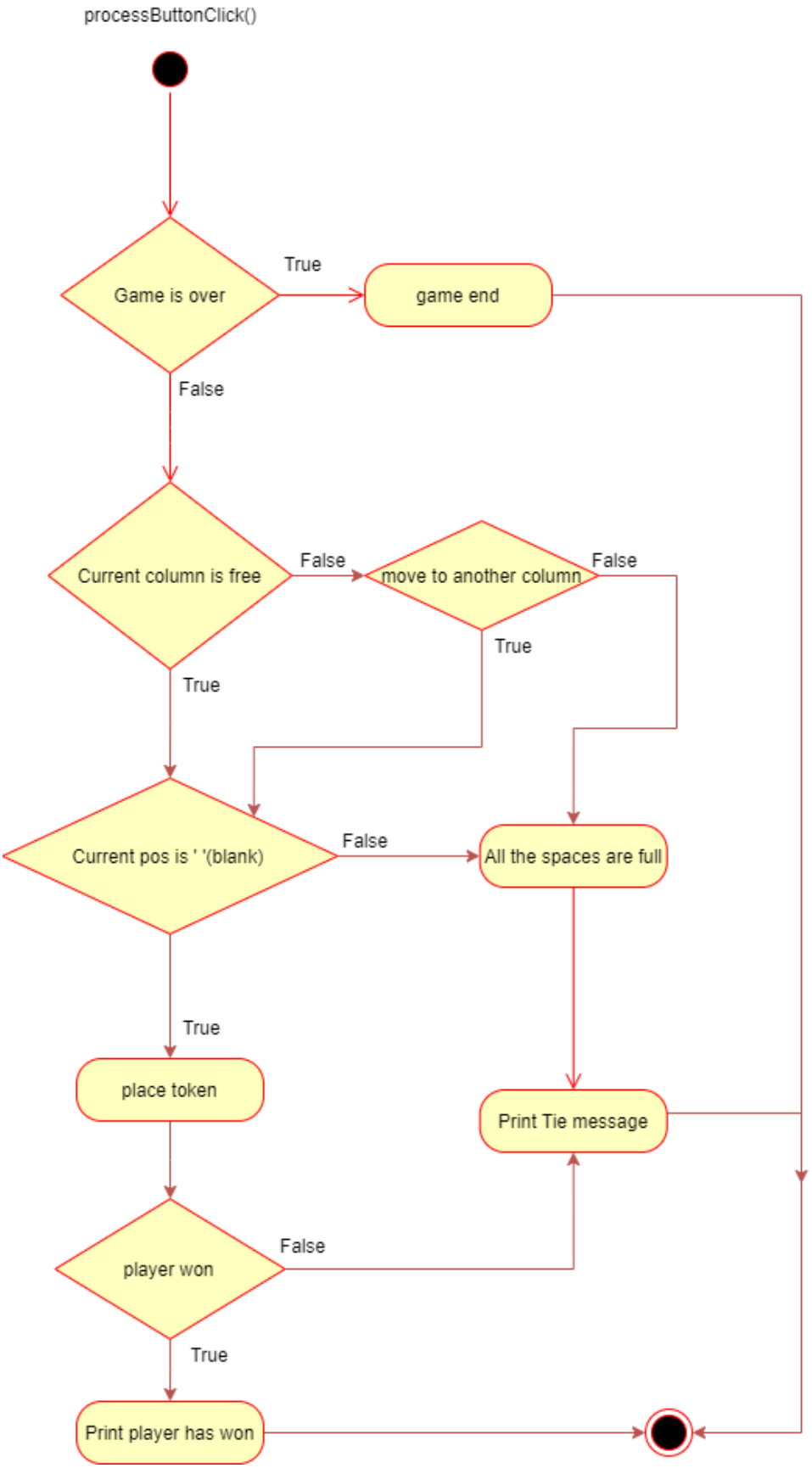

getNumColumns
getNumColumns
return column


getNumToWin
getNumToWin
return numToWin


GameBoardMem Constructor
set pRow to maxRow
set pCol to maxCol
set pWin to numToWin


gameboardmem isPlayerAtPos
get[player].contains(pos)
No
return false
Yes
return true


Gameboardmem whatsAtPos
set an incrementer for number of keys in map
does the list contain that position ?
No
are there more keys?
yes
Yes
increment it
return that key
return ' '
gameboardMem getNumRows
gameboardMem getNumColumns
gameboardMem getNumToWin
getNumRows
getNumColumns
getNumToWin
return maxRow
return maxCol
return numToWin


processButtonClick()
Game is over
True
game end
False
Current column is free
False
move to another column
False
True
True
Current pos is ' '(blank)
False
All the spaces are full
True
place token
Print Tie message
player won
False
True
Print player has won