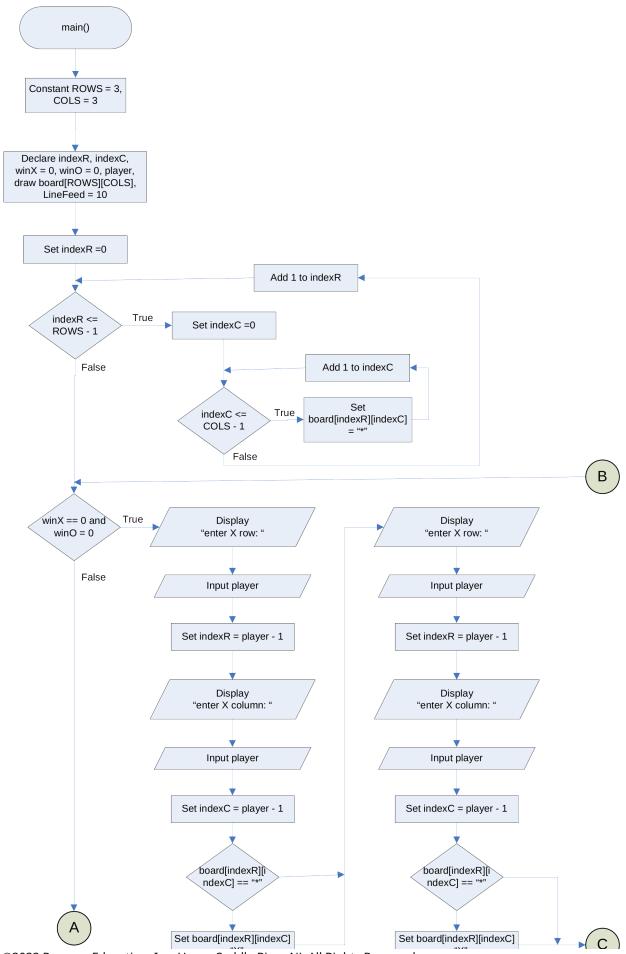**Programming Exercise 8-11**

```
// main module
Module main()
    // Local variables
    Constant Integer ROWS = 3, COLS = 3
    Declare Integer indexR, indexC
    Declare winX = 0, winO = 0, player, draw
    Declare String board[ROWS][COLS], LineFeed = 10

    //initialize
    For indexR = 0 to ROWS – 1
        For indexC = 0 to COLS – 1
            Set board[indexR][indexC] = "*"
        End For
    End For

    // game
    While winX == 0 and winO = 0
        // enter location for X
        Display "enter X row: "
        Input player
        Set indexR = player - 1
        Display "enter X column: "
        Input player
        Set indexC = player – 1
        If board[indexR][indexC] == "*" Then
            Set board[indexR][indexC] = "X"
        End If

        // enter location for O
        Display "enter O row: "
        Input player
        Set indexR = player - 1
        Display "enter O column: "
        Input player
        Set indexC = player – 1
        If board[indexR][indexC] == "*" Then
            Set board[indexR][indexC] = "O"
        End If

        // check rows
        For indexR = 0 to ROWS – 1
            If board[indexR][0] != "*" Then
                If board[indexR][0] == board[indexR][1] Then
                    If board[indexR][1] == board[indexR][2] Then
                        If board[indexR][0] == "X" Then
                            Set winX = 1
                        Else
                            Set winO = 1
                        End If
                    End If
```

```
                End If
            End If
        End For


        // check columns
        For indexC = 0 to COLS – 1
            If board[0][indexC] != "*" Then
                If board[0][indexC] == board[1][indexC] Then
                    If board[1][indexC] == board[2][indexC] Then
                        If board[0][indexC] == "X" Then
                            Set winX = 1
                        Else
                            Set winO = 1
                        End If
                    End If
                End If
            End If
        End For


        // check diagonal
        If board[0][0] != "*" Then
            If board[0][0] == board[1][1] Then
                If board[1][1] == board[2][2] Then
                    If board[0][0] == "X" Then
                        Set winX = 1
                    Else
                        Set winO = 1
                    End If
                End If
            End If
        End If
        If board[0][2] != "*" Then
            If board[0][2] == board[1][1] Then
                If board[1][1] == board[2][0] Then
                    If board[0][2] == "X" Then
                        Set winX = 1
                    Else
                        Set winO = 1
                    End If
                End If
            End If
        End If


        //check if draw
        Set draw = 9
        For indexR = 0 to ROWS – 1
            For indexC = 0 to COLS – 1
                If board[indexR][indexC] == "*" Then
                    Set draw = 0
                End If
            End For
        End For
```

```
        If draw == 9 Then
                Set winX = 1
                Set winO = 1
        End If

        //display board
        For indexR = 0 to ROWS – 1
                For indexC = 0 to COLS – 1
                        Display board[indexR][indexC]
                End For
                Display LineFeed
        End For
    End While


    // show result
    If draw == 9 Then
        Display "Game is a draw."
    Else
        If winX == 1 Then
                Display "X wins!"
        Else
                Display "O wins!"
        End If
    End If

End Module
```

```
main()
```

Constant ROWS = 3,
COLS = 3

Declare indexR, indexC,
winX = 0, winO = 0, player,
draw board[ROWS][COLS],
LineFeed = 10

Set indexR = 0

Add 1 to indexR

indexR <=
ROWS - 1

True → Set indexC = 0

Add 1 to indexC

indexC <=
COLS - 1

True → Set
board[indexR][indexC]
= "*"

False

B

winX == 0 and
winO == 0

True → Display
"enter X row: "

False

Input player

Set indexR = player - 1

Display
"enter X column: "

Input player

Set indexC = player - 1

board[indexR][i
ndexC] == "*"

Set board[indexR][indexC]

A

Display
"enter X row: "

Input player

Set indexR = player - 1

Display
"enter X column: "

Input player

Set indexC = player - 1

board[indexR][i
ndexC] == "*"

Set board[indexR][indexC]

C