```
;Christofer Patrick Paes
;Program 12b
; CSC240 AA
; Connect Four -- Game state is initialized with (CUPStartGame)
; Game is not finished
; there are many helper functions within the game to assist with working with a matrix


(define (countRow ist )
  (define x 0)
  (if(null? ist)
     0
       (if(not (pair? (car ist) ) )
          1
 (+ 1 (countRow (cdr ist)  ) x  )
 )
          ) )




(define(getRowInReverse ist rowN)
  (if(= (countRow ist) 0)
     '()
     (if(or(= (countRow ist) 1)(= rowN (countRow ist) ) )
        (car ist)
        (getRowInReverse (cdr ist) rowN)




) ) )



(define(countRow1 ist)
  (define x 0)
  (if(null? ist)
     0
    (if(null? (car(cdr(car ist) ) ) )
        (+  1 x)
```

```
      (+ 1 (countRow1 (cdr ist)) x)




    ) ) )



(define(countCell ist)
  (define x 0)
  (if(null? ist)
    0
  (if(not(= (countRow ist) 1 ) )
       (+ 1 (countCell (cons (cdr(car ist) ) (cdr ist)) ) x)
         (if(null? (car ist) )
    (+ 1 (countCell (cdr ist)  ) x)
    (+ 1 (countCell (cons (cdr(car ist) ) (cdr ist)) ) x) )

   )

  ) )
(define(getColumn ist columnN)
  (if(null? ist)
    '()
    (if(and(= (countRow ist) 1) (=(countCell ist) 1))
          (car (car ist))
          (getColumn (cons  (cdr(car ist)) (cdr ist)) (- columnN)) )
       )
    )

    (define(getCell Matrix Row Column )
       (if(not(= Row 0) )
      (getCell (getRowInReverse Matrix Row) 0 Column   )
      (if(and(= Column 1) (= Row  0) )
          (car Matrix)
      (if(and(not(= Column 1)) (= Row 0) )
      (getCell (cdr Matrix) 0 (- Column 1) )
      (getCell  Matrix Row Column  )

)
    )
       )
```

```
    )


(define(setCellM Matrix Row Column Item)
(if(null? Matrix )
   '()
   (if (not(<= Row 0))
      (setCellM (cons (car Matrix )(cdr Matrix))   (- Row 1)  Column Item )
      (if(and(> Column 0) (= Row 0))
       (cons (setCellM (car Matrix) -100   Column Item) (cdr Matrix))
         (if(and(> Column 1) (= Row -100) )
          (cons (car Matrix) (setCellM (cdr Matrix) Row (- Column 1) Item) )
      (cons Item (cons (car Matrix) (cdr Matrix)))



  ) ) ) ) )




(define(setCell Matrix Row Column Item )
  (if(and(= Row 0) (= Column 1) )
     (cons (cons Item (car Matrix) ) (cdr Matrix) )
     (if(not(= Row 0))
    (cons (cons Item (car Matrix) )(setCell (cdr Matrix) (- Row 1) Column Item  ) )
    (if(and(= Row 0) (not(= Column 1)))
        (cons  (car Matrix) (setCell (car(cdr Matrix))  Row Column Item  ) )
       (cons (car Matrix) (setCell (cdr Matrix)  Row  (- Column 1) Item  ) )


))))



(define CUPGame 0)

(define(CUPStartGame)
(begin
(set! CUPGame '( 1 2 (0 0 0 0 0 0) (0 0 0 0 0 0) (1 1 1 1 1 1) (0 0 0 0 0 0) (0 0 0 0 0 0) (0 0 0 0 0
0) (0 0 0 0 0 0) ) )
```

```
(display "This is the connect four game(copyright Hasbro inc.)" ) (newline)

#t))




   (define (CUPShowGame )
(begin

          (newline)(newline)
          (newline)
          '(this is column format)
          (display (cdr(cdr CUPGame) ) )

          (newline)

     ) )

(define(convertColumn Matrix t c)
  (if(= c 0)
    '()
    (if(and(> c 5) (> t 1))

    (cons
     (car (getRowInReverse  Matrix t ))
    (convertColumn Matrix (- t 1) c) )
    (if(and (> c 5) (= t 1) )
       (cons
        (car (getRowInReverse Matrix t ))
                 (convertColumn Matrix (+ t 6) (- c 1))
               )
       (if(and (> c 4) (> t 1) )
          (cons
           (car (getRowInReverse   Matrix  t))
                (convertColumn Matrix (- t 1) c)
                )
          (if(and(> c 4) (= t 1) )
             (cons
              (car (getRowInReverse Matrix t ))
              (convertColumn Matrix (+ t 6) (- c 1) )
```

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        )

        (if(and(> c 3 ) (> t 1) )
          (cons
           (car
            (getRowInReverse Matrix t ) )
           (convertColumn Matrix (- t 1) c)
            )
          (if(and(> c 3) (= t 1))
                (cons
                 (car
                  (getRowInReverse Matrix t))
                  (convertColumn Matrix (+ t 6) (- c 1) )
                  )
                (if(and (> c 2) (> t 1) )
                  (cons
                   (car
                    (getRowInReverse Matrix t))

          (convertColumn Matrix (- t 1) c) )
                   (if(and(> c 2) (= t 1))
                     (cons
                      (car
                       (getRowInReverse Matrix t))
                      (convertColumn Matrix (+ t 6) (- c 1))
                      )
                     (if(and(> c 1) (> t 1 ))
                       (cons
                        (car
                         (getRowInReverse Matrix t))
                        (convertColumn Matrix (- t 1) c))
                       (if(and (> c 1) ( = t 1) )
                         (cons
                          (car
                           (getRowInReverse Matrix t  ))
                           (convertColumn Matrix t (- c 1) )
      )
                           (convertColumn Matrix t (- c 1) ))
  )
)
        )
                  )
                )
          )
```

```
            ) ) ) )   )



(define(CUPMakeMove Matrix Column)
  (if(=(countRow1 Matrix) 0)
  '()
  (if(= Column 1)
     (car Matrix)
     (CUPMakeMove (cdr Matrix) (- Column 1) )
     )) )


(define(CUPMarkMove move)
(begin
(set! CUPGame
(cons
(CUPNextPlayer )
(cons
(CUPMove (car(cdr(cdr CUPGame))) (car CUPGame ) move) '()
)
)
)
move) )

(define(CUPMove ist token move)
  (if(= move 1)
     (cons token (cdr ist) )
     (cons
      (car ist)
      (CUPMove (cdr ist) token (- move 1))
) )
  )



(define(CUPLegalMoveP Column)
(begin
(if (=  (CUPLegalMoveX (CUPGiveMeColumn (cdr (cdr CUPGame)) Column) ) 0)
#true
#false
)
```

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 )
)

(define(CUPLegalMoveX Column)
  (if(null?  Column)
     1
(if(= (car Column) 0)
0
(CUPLegalMoveX (cdr Column) )
) ))




(define(CUPGiveMeColumn Matrix Column)
  (if(=(countRow1 Matrix) 0)
  '()
  (if(= Column 1)
     (car Matrix)
     (CUPGiveMeColumn (cdr Matrix) (- Column 1) )
     )) )

(define x 0)
  (define(moveToNextRow  ist)

    (if(or(null? ist) (= x 4) )
       0
(if(= (car ist) 1)
(+ x  (moveToNextRow (cdr ist) )  1)
(if(= (car ist) 0)
   (- x  (moveToNextRow (cdr ist)) 100)
(moveToNextRow (cdr ist) )



)
)
) )

   (define(getCell1 Matrix Row Column )
         (if(null? Matrix)
            '()
        (if(not(= Row 0) )
       (getCell1 (CUPGiveMeColumn Matrix Row) 0 Column    )
       (if(and(= Column 1) (= Row  0) )
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```
          (car Matrix)
       (if(and(not(= Column 1)) (= Row 0) )
       (getCell1 (cdr Matrix) 0 (- Column 1) )
       (getCell1  Matrix Row Column  )

)
    )
      )


   ))

(define Row 0)
(define Column 0)
(define(diagonalWin t )
  (if(= t 0)
     x
  (if (= (getCell1  (cdr (cdr CUPGame) ) (+ Column 1) (+ Row 1) ) 1)
      (+ x(diagonalWin (- t 1) )1)
      (diagonalWin (- t 1)
      )
  )
  ) )
(define y 0)
(define(checkColumn colm row)

  (if  ( < row 1)
      0
 (if(and(= (getCell1 (cdr (cdr CUPGame)) colm row    ) 1) (<= row 6))
  (+ y (checkColumn colm (- row 1) ) 1)
 (checkColumn colm (- row  1) )
   )) )

(define(WinP Column)
  (if(or (>= (checkColumn Column 6)  4)( = (diagonalWin 4) 4) )
      #t
      #f
      ))

(define( checkPlayer)
  (if (= (CUPNextPlayer) 2)
      #t
      #f))
```

```
(define (CUPNextPlayer)
(if( = (car CUPGame) 1)
   2
   1))
```