Programming Design Worksheet - Redfield
for CS1310 (programs 2-7) and CS1311 (programs 1-6)

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Print it for class (if you must miss, submit one file to Designs).
First name **Davide** Last name **Russillo**
Design for program name **Tic-Tac-Toe**

DATA

Variables needed in **WORDS for main** and **globally**

GLOBAL

Board array
Player x or y
row number
column number
move counter

MAIN

input character

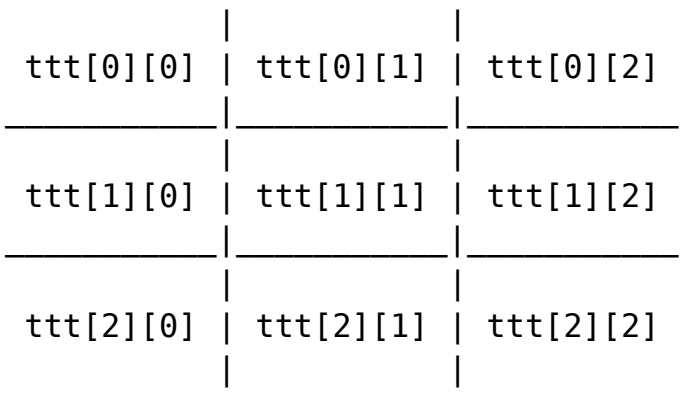
C ***DECLARATIONS*** for main & global

```
char ttt[3][3];
char player = 'X';
int row;
int col;
int moves;

char input;
```

(STARTING TicTacToe:put image; or draw: Insert, Drawing; or put at end of the file)

draw in RAM with possible values



Algorithm to PSEUDOCODE level for each function

(*remember to indent under* if, switch, while, do-while, for)

main:

print welcome to tictactoe! X goes first. press enter to start
input newline character into input
clear_board()
while check_win() returns 0
    print clearpage
    draw_board_options()
    draw_board(0)
    take_turn()
reassign_player()
reassign_player()
print clearpage
draw_board_options
draw_board(check_if_win())

other functions (**bold the names**): (put them before main in the program!)

```
void draw_board_options(void)
  print _1_|_2_|_3_
        _4_|_5_|_6_
         7 | 8 | 9

void draw_board(int winstate)
  int i
int wintype = winstate / 10
int wincoord = winstate – winstate2 / 10 * 10

  for each row
    for each of the five ascii rows
      for each column
        if ttt[row][col] is empty
          print empty cell
       else
         switch i
           case first row
              if player is X
                if wintype is 1
                  print type one X ascii art
                else if wintype is 2
                  print type two X ascii art
                ...
                ...
                else print empty line
              else
                if wintype is 1
                  print type one Y ascii art
           case second row
           ...
           ...
         if win is on row print =
         else if diagonal add // or \\
         else add | unless last column
       print newline
  if tie print tie
  else if win print player won!
```

```
void clear_board(void)
     for each row
          for each column
               set ttt[row][col] = empty

void take_turn(void)
     int position
     int position_valid = 0
     int x
     int y

     while the position is invalid
          print its player's turn, choose an empty field
          input number into position
          position_valid = 1
          switch position
               case 1
                    set x to 0, y to 0
               case 2
                    set x to 0, y to 1
               ...
               case 4 set x to 1, y to 0
               ...
               ...
               default
                    position_valid = 0
          if ttt[x][y] is empty and position_valid is 1
               ttt[x][y] = player
          else
               position_valid = 0
               print clearpage
               draw_board_options()
               draw_board(0)
               print Invalid input try again
     increment moves

void reassign_player(void)
     if player is X
          set player to O
     else
          set player to X
```

```
int check_if_win(void)
  int i

  for i from 0 to 2
    if ttt[i][0] is not empty is equal to ttt[i][1] and ttt[i][2]
      return 10 + i
    else if ttt[0][i] is not empty and is equal to ttt[1][i] and
    ttt[2][i]
      return 20 + i
  if ttt[0][0] is not empty and is equal to ttt[1][1] and ttt[2][2]
    return 30
  else if ttt[0][2] is not empty and is equal to ttt[1][1] and
  ttt[2][0]
    return 40
  else if moves equals 9
    return 50
  return 0
```

<u>OTHER part of the design</u> (see assignment - *input or sample output*)

```
_1_|_2_|_3_
_4_|_5_|_6_
 7 | 8 | 9
          |     |     |
   X X    |    O|O    |    X X
    X     |   O | O   |     X
   X X    |    O|O    |    X X
__________|_____|_____|__________
          |     |     |
   X X    |    O|O    |
    X     |   O | O   |
   X X    |    O|O    |
__________|_____|_____|__________
          |     |     |
          |    O|O    |
          |   O | O   |
          |    O|O    |
          |     |     |
O won!
```