1) Ask the user for input to run in ***Random*** or ***Manual*** Mode. Next, regardless of the mode the user choses, ask the user for the number of rows and columns of the normal form. Your code should be able to handle sizes of 1x1 to 9x9 without any display issues.

Example:

```
Enter (R)andom or (M)anual payoffs enteries
R
Enter the number of rows: 5
Enter the number of cols: 7
```

RANDOM MODE

2) If the random mode is selected the application will display the strategy spaces and payoffs of players 1 and 2. In random mode the random payoffs are integers that range from -99 to 99.

Example:

```
-------------------------------------
Player: Player1's strategies
-------------------------------------
{A1, A2, A3, A4, A5}

-------------------------------------
Player: Player1's payoffs
-------------------------------------
-79,  54,  33,  55, -27,  32, -97
 59, -98, -59, -96,  41,  37,  46
 19, -25,  89, -64,  54, -98,  91
 14,  45, -59,  50,  -5,  83, -48
 28,  32,  33, -75, -13, -50,  44

-------------------------------------
Player: Player2's strategies
-------------------------------------
{B1, B2, B3, B4, B5, B6, B7}

-------------------------------------
Player: Player2's payoffs
-------------------------------------
-92,  -6,  78, -60, -69,   2,  82
 64, -56, -77, -71, -19, -81, -14
 -8, -88, -69, -93, -42, -95,  23
-95,  49,  25, -31, -18,  18,  75
-11, -40, -10, -76, -22,  76,  75
```

3) The application will display the normal form of the game. The game must handle normal forms of size 1x1 to 9x9 without alignment issues. Notice that player1 strategies are dynamically named A1, A2 …and for player2 B1, B2 …

Example:

```
======================================
Display Normal Form
======================================
          B1            B2            B3            B4            B5            B6            B7
   ---------------------------------------------------------------------------------------------------------
 A1 |  (-79,-92)   |  ( 54,-6 )   |  ( 33,78 )   |  ( 55,-60)   |  (-27,-69)   |  ( 32,2  )   |  (-97,82 )  |
   ---------------------------------------------------------------------------------------------------------
 A2 |  ( 59,64 )   |  (-98,-56)   |  (-59,-77)   |  (-96,-71)   |  ( 41,-19)   |  ( 37,-81)   |  ( 46,-14)  |
   ---------------------------------------------------------------------------------------------------------
 A3 |  ( 19,-8 )   |  (-25,-88)   |  ( 89,-69)   |  (-64,-93)   |  ( 54,-42)   |  (-98,-95)   |  ( 91,23 )  |
   ---------------------------------------------------------------------------------------------------------
 A4 |  ( 14,-95)   |  ( 45,49 )   |  (-59,25 )   |  ( 50,-31)   |  ( -5,-18)   |  ( 83,18 )   |  (-48,75 )  |
   ---------------------------------------------------------------------------------------------------------
 A5 |  ( 28,-11)   |  ( 32,-40)   |  ( 33,-10)   |  (-75,-76)   |  (-13,-22)   |  (-50,76 )   |  ( 44,75 )  |
   ---------------------------------------------------------------------------------------------------------
```

4) Display the Pure Nash Equilibrium by replacing the numerical value of the best response by an ***'H'*** in the normal form. Also output the Pure Nash Equilibrium(s). If there is no Pure Nash Equilibrium still output the normal form with replacing the numerical value of the best response by an 'H' and stated there are no Pure Nash Equilibrium.

Example:

```
======================================
Nash Pure Equilibrium Locations
======================================
          B1            B2            B3            B4            B5            B6            B7
   ---------------------------------------------------------------------------------------------------------
 A1 |  (-79,-92)   |  (  H,-6 )   |  ( 33,78 )   |  (  H,-60)   |  (-27,-69)   |  ( 32,2  )   |  (-97,H  )  |
   ---------------------------------------------------------------------------------------------------------
 A2 |  (  H,H  )   |  (-98,-56)   |  (-59,-77)   |  (-96,-71)   |  ( 41,-19)   |  ( 37,-81)   |  ( 46,-14)  |
   ---------------------------------------------------------------------------------------------------------
 A3 |  ( 19,-8 )   |  (-25,-88)   |  (  H,-69)   |  (-64,-93)   |  (  H,-42)   |  (-98,-95)   |  (  H,H  )  |
   ---------------------------------------------------------------------------------------------------------
 A4 |  ( 14,-95)   |  ( 45,49 )   |  (-59,25 )   |  ( 50,-31)   |  ( -5,-18)   |  (  H,18 )   |  (-48,H  )  |
   ---------------------------------------------------------------------------------------------------------
 A5 |  ( 28,-11)   |  ( 32,-40)   |  ( 33,-10)   |  (-75,-76)   |  (-13,-22)   |  (-50,H  )   |  ( 44,75 )  |
   ---------------------------------------------------------------------------------------------------------

Nash Pure Equilibrium(s): (A2, B1)   (A3, B7)
```

5) Create random beliefs then calculate the Expected Payoffs and Best Response(s) for players 1 and 2.

Example:

```
---------------------------------------------
Player 1 Expected Payoffs with Player 2 Mixing
---------------------------------------------
U(A1,(0.12, 0.18, 0.01, 0.19, 0.08, 0.19, 0.23)) = -7.37
U(A2,(0.12, 0.18, 0.01, 0.19, 0.08, 0.19, 0.23)) = -8.50
U(A3,(0.12, 0.18, 0.01, 0.19, 0.08, 0.19, 0.23)) = -6.86
U(A4,(0.12, 0.18, 0.01, 0.19, 0.08, 0.19, 0.23)) = 23.02
U(A5,(0.12, 0.18, 0.01, 0.19, 0.08, 0.19, 0.23)) = -5.22

-----------------------------------------
Player 1 Best Response with Player 2 Mixing
-----------------------------------------
BR(0.12, 0.18, 0.01, 0.19, 0.08, 0.19, 0.23) = {A4}


---------------------------------------------
Player 2 Expected Payoffs with Player 1 Mixing
---------------------------------------------
U((0.19, 0.28, 0.16, 0.17, 0.19), B1) = -19.08
U((0.19, 0.28, 0.16, 0.17, 0.19), B2) = -30.17
U((0.19, 0.28, 0.16, 0.17, 0.19), B3) = -15.43
U((0.19, 0.28, 0.16, 0.17, 0.19), B4) = -65.87
U((0.19, 0.28, 0.16, 0.17, 0.19), B5) = -32.39
U((0.19, 0.28, 0.16, 0.17, 0.19), B6) = -20.00
U((0.19, 0.28, 0.16, 0.17, 0.19), B7) = 42.34

-----------------------------------------
Player 2 Best Response with Player 1 Mixing
-----------------------------------------
BR(0.19, 0.28, 0.16, 0.17, 0.19) = {B7}
```

6) Calculate the Expected Payoffs for players 1 and 2 with their actual mix that uses the random generated beliefs in step 6.

Example:

```
-----------------------------------------------------
Player 1 & 2 Expected Payoffs with both Players Mixing
-----------------------------------------------------
Player 1 -> U((0.19, 0.28, 0.16, 0.17, 0.19), (0.12, 0.18, 0.01, 0.19, 0.08, 0.19, 0.23)) = -1.96
Player 2 -> U((0.19, 0.28, 0.16, 0.17, 0.19), (0.12, 0.18, 0.01, 0.19, 0.08, 0.19, 0.23)) = -17.04
```

7) In random mode if the normal form is 2x2 and there is no Pure Nash Equilibrium then calculate the indifference probabilities of players 1 and 2.

Example:

```
---------------------------------------------
Player 1 & 2 Indifferent Mix Probabilities
---------------------------------------------
Player 1 probability of strategies (A1) = 0.44
Player 1 probability of strategies (A2) = 0.56
Player 2 probability of strategies (B1) = 1.26
Player 2 probability of strategies (B2) = -0.26


======================================
Nash Equilibrium Locations
======================================
           B1             B2
    ------------------------------
 A1 |  (  H,-54)   |  (-10,H  )  |
    ------------------------------
 A2 |  (-50,H  )   |  (  H,-60)  |
    ------------------------------
Nash Equilibrium(s): None
```

In case there is a Pure Nash Equilibrium

```
======================================
Nash Equilibrium Locations
======================================
           B1             B2
    ------------------------------
 A1 |  ( 47,H  )   |  ( 17,-40)  |
    ------------------------------
 A2 |  (  H,-34)   |  (  H,H  )  |
    ------------------------------
Nash Equilibrium(s): (A2, B2)

---------------------------------------------
Player 1 &  2 Indifferent Mix Probabilities
---------------------------------------------
Normal Form has Pure Strategy Equilibrium
```

MANUAL MODE

8) In manual mode get user input for the rows, columns and payoffs. Then display the Normal form and the Pure Nash Equilibrium information.

Example:

```
Enter (R)andom or (M)anual payoffs enteries
M
Enter the number of rows: 3
Enter the number of cols: 4

Manual Entries
Enter payoff for ( A1, B1 ) = 1,2
Enter payoff for ( A1, B2 ) = 3,2
Enter payoff for ( A1, B3 ) = 5,2
Enter payoff for ( A1, B4 ) = 4,2
-------------------------
Enter payoff for ( A2, B1 ) = 5,2
Enter payoff for ( A2, B2 ) = 8,2
Enter payoff for ( A2, B3 ) = 4,5
Enter payoff for ( A2, B4 ) = 1,2
-------------------------
Enter payoff for ( A3, B1 ) = 4,2
Enter payoff for ( A3, B2 ) = 3,3
Enter payoff for ( A3, B3 ) = 5,6
Enter payoff for ( A3, B4 ) = 1,1
-------------------------
=====================================
Display Normal Form
=====================================
           B1             B2             B3             B4
    ---------------------------------------------------------------
 A1 |  (  1,2  )   |  (  3,2  )   |  (  5,2  )   |  (  4,2  )  |
    ---------------------------------------------------------------
 A2 |  (  5,2  )   |  (  8,2  )   |  (  4,5  )   |  (  1,2  )  |
    ---------------------------------------------------------------
 A3 |  (  4,2  )   |  (  3,3  )   |  (  5,6  )   |  (  1,1  )  |
    ---------------------------------------------------------------
=====================================
Nash Equilibrium Locations
=====================================
           B1             B2             B3             B4
    ---------------------------------------------------------------
 A1 |  (  1,H  )   |  (  3,H  )   |  (  H,H  )   |  (  H,H  )  |
    ---------------------------------------------------------------
 A2 |  (  H,2  )   |  (  H,2  )   |  (  4,H  )   |  (  1,2  )  |
    ---------------------------------------------------------------
 A3 |  (  4,2  )   |  (  3,3  )   |  (  H,H  )   |  (  1,1  )  |
    ---------------------------------------------------------------
Nash Equilibrium(s): (A1, B3)   (A1, B4)   (A3, B3)
```

9) If the Normal Form is 2x2 and the game does not have a Pure Nash Equilibrium then calculate players 1 and 2 Indifferent Mix Probabilities.

Example:

```
Enter (R)andom or (M)anual payoffs enteries
M
Enter the number of rows: 2
Enter the number of cols: 2

Manual Entries
Enter payoff for ( A1, B1 ) = -1,1
Enter payoff for ( A1, B2 ) = 1,-1
--------------------------
Enter payoff for ( A2, B1 ) = 1,-1
Enter payoff for ( A2, B2 ) = -1,1
--------------------------
======================================
Display Normal Form
======================================
           B1             B2
    ----------------------------
 A1 |  ( -1,1  )   |  (  1,-1 )  |
    ----------------------------
 A2 |  (  1,-1 )   |  ( -1,1  )  |
    ----------------------------
======================================
Nash Equilibrium Locations
======================================
           B1             B2
    ----------------------------
 A1 |  ( -1,H  )   |  (  H,-1 )  |
    ----------------------------
 A2 |  (  H,-1 )   |  ( -1,H  )  |
    ----------------------------
Nash Equilibrium(s): None

----------------------------------------------
Player 1 &  2 Indifferent Mix Probabilities
----------------------------------------------
Player 1 probability of strategies (A1) = 0.50
Player 1 probability of strategies (A2) = 0.50
Player 2 probability of strategies (B1) = 0.50
Player 2 probability of strategies (B2) = 0.50
```

In case there are Pure Nash Equilibrium(s)

```
======================================
Display Normal Form
======================================
           B1             B2
    ----------------------------
 A1 |  (  1,1  )   |  (  0,0  )  |
    ----------------------------
 A2 |  (  0,0  )   |  (  2,2  )  |
    ----------------------------
======================================
Nash Equilibrium Locations
======================================
           B1             B2
    ----------------------------
 A1 |  (  H,H  )   |  (  0,0  )  |
    ----------------------------
 A2 |  (  0,0  )   |  (  H,H  )  |
    ----------------------------
Nash Equilibrium(s): (A1, B1)   (A2, B2)

----------------------------------------------
Player 1 &  2 Indifferent Mix Probabilities
----------------------------------------------
Normal Form has Pure Strategy Equilibrium
```