Kulliyyah of Information and Communications Technology
Department of Computer Science

International Islamic University Malaysia
Semester II 2017/2018

INTELLIGENT SYSTEMS

CSC 2301

SECTION 1

GROUP NAME: ANYTHING

LECTURER'S NAME: DR NORZALIZA BINTI MD NOR

BrainMatrix game in Python

GROUP PROJECT ASSESSMENT #1

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1.0 Introduction

An intelligent system is a machine with an embedded, Internet connected computer that has the capacity to gather and analyse data and communicate with other systems. Other aspects of intelligent systems include the capacity to learn from experience, security, connectivity, the ability to adapt according to current data and the capacity for remote monitoring and management. We will be implementing the concept of intelligent systems by creating a game using Python language and we have named it **BrainMatrix**.

This game consists of multiple games which are chosen by the system's cognitive ability, for the user depending on their intelligence. At the beginning, the user will be prompted with several brain teasing questions. Once the user has answered those questions, the system will use its cognitive method to make a decision on which game the user is capable of playing. Finally, the user will then have fun playing the game that has been assigned to him/her.

We chose Python due to its simplicity compared to other programming languages such as C++, C#, Java, etc.

2.0 Objectives

- Develop a fully functional IQ game.
- Implement the Python language efficiently.
- Provide an aesthetic appeasing game interface.
- Test the ability of an intelligent system based on how it makes a decision depending on the available data.

3.0 Expected Output

The game should function with full efficiency and make the user satisfied. The system is expected to differentiate the level of intelligence of a user, and then successfully assign the most suitable game according to his/her IQ.

4.0 Functionality

We will use these functionalities to implement our game:

- Array
- Function
- Control Statements
- Loop

Etc….

5.0 Literature Review

5.1 Background problem

There are many games available where you can play and spend your leisure. Most of the games are focusing on only one part, for example – if someone find a game on tic tac toe, he/she will only play tic tac toe in that game. As a result, after some time he/she will get bored and stop the game.

We have made an attempt to solve this problem. We noticed that most people want to tease their brain. They like to think and answer tricky question. So, we wanted to combine these both tricky question and game in our project.

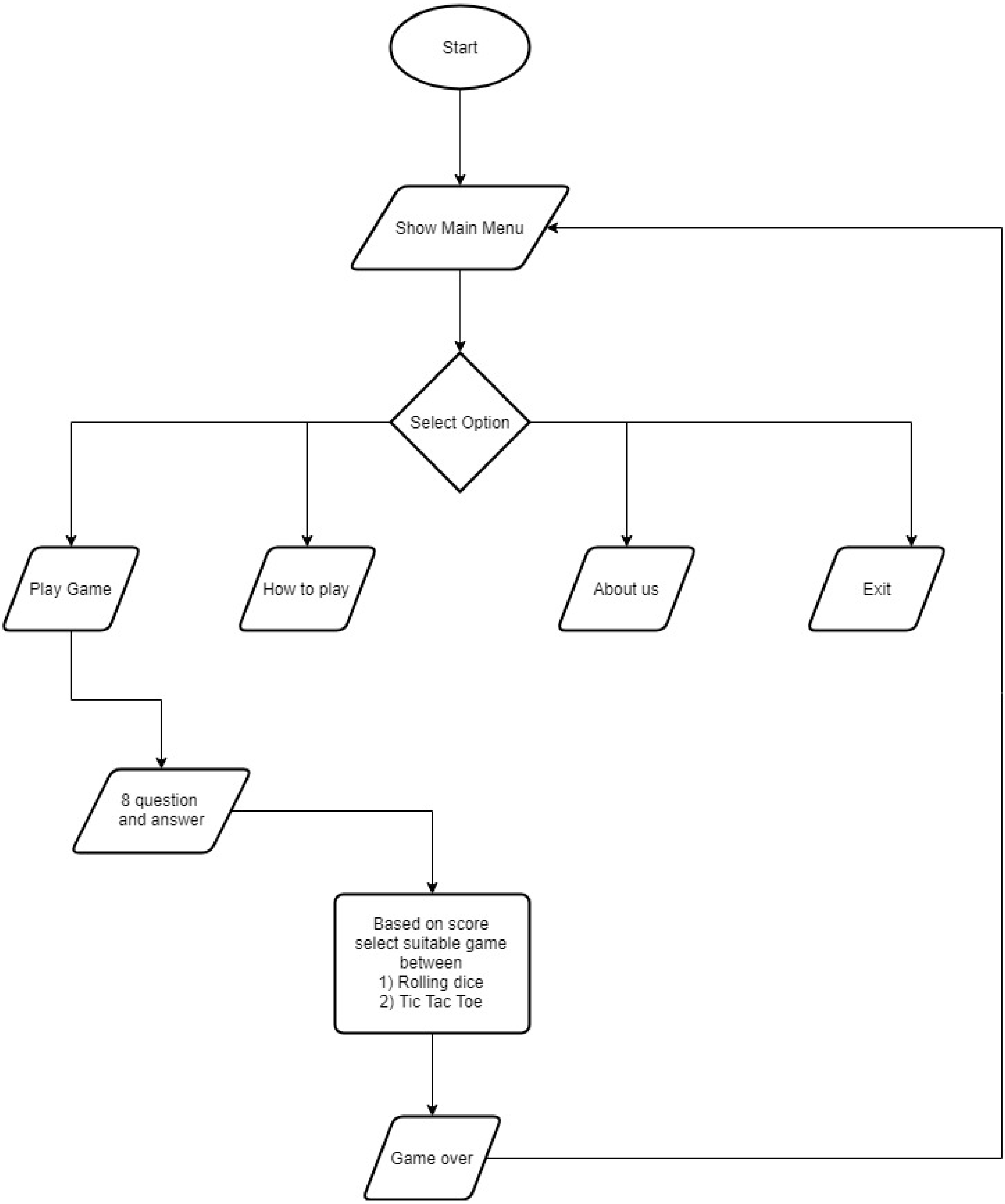
Most students pass their free time playing games. We want them to enjoy not only the games but also learn something.

Solution:

Our team came up with two simple game – rolling dice and tic tac toe. We also came up with different level of IQ question. Our plan is to give randomly 8 IQ question each time when starting the game. Based on the correct answer provided system will give him either rolling dice or tic tac toe. In this way, player will be more thrilled to answer all the question asked and play according to his merit. If he wants to play tic tac toe, then he needs to answer at least 5 questions correctly. Player will be interested to know and learn about these IQ question.

We are giving the player a mixture of IQ question, like – general knowledge, math solving, thinking problem etc. This will specially help the students to learn more and extend his knowledge in different areas.

5.2 Flow Chart



5.3 Reference

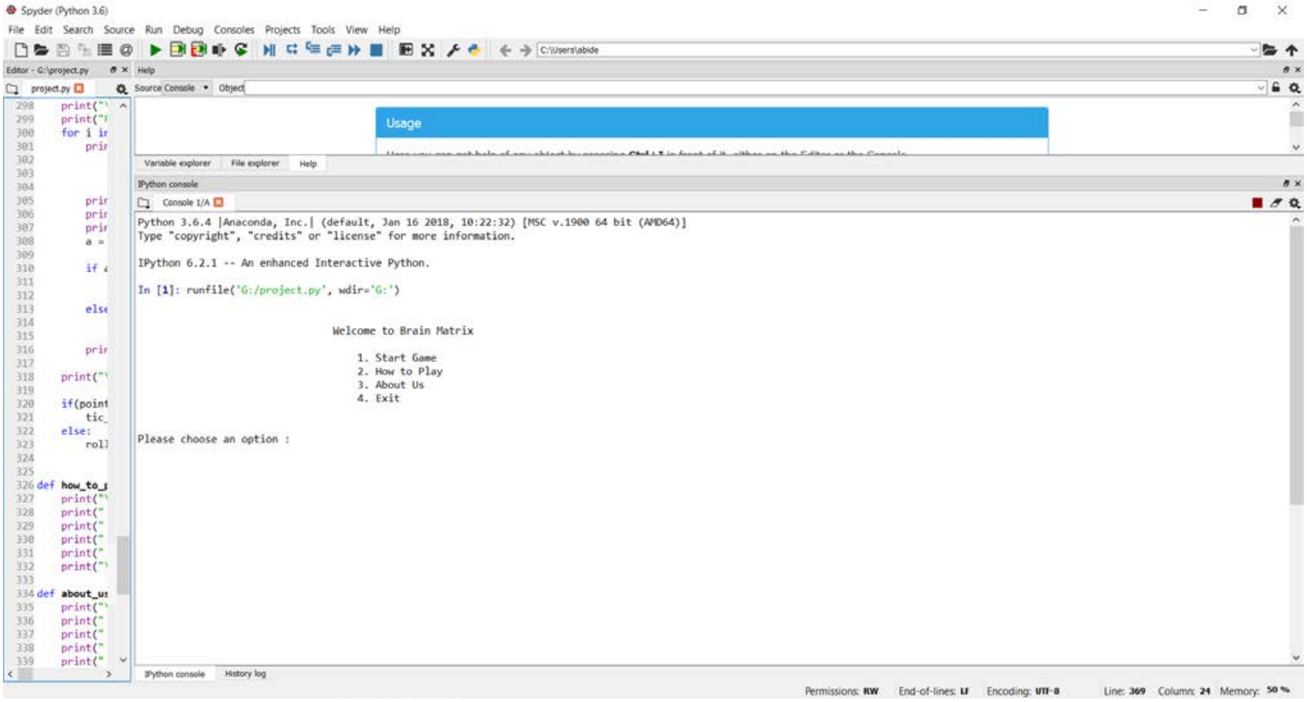
1) **https://www.learnpython.org/**
2) **https://www.edx.org/course/introduction-computer-science-mitx-6-00-1x-11**
3) **https://www.edx.org/course/introduction-to-python-fundamentals**
4) **https://codeclubprojects.org/en-GB/python/**

5.4 Future work

This project can be further extended with some more added feature in the future.

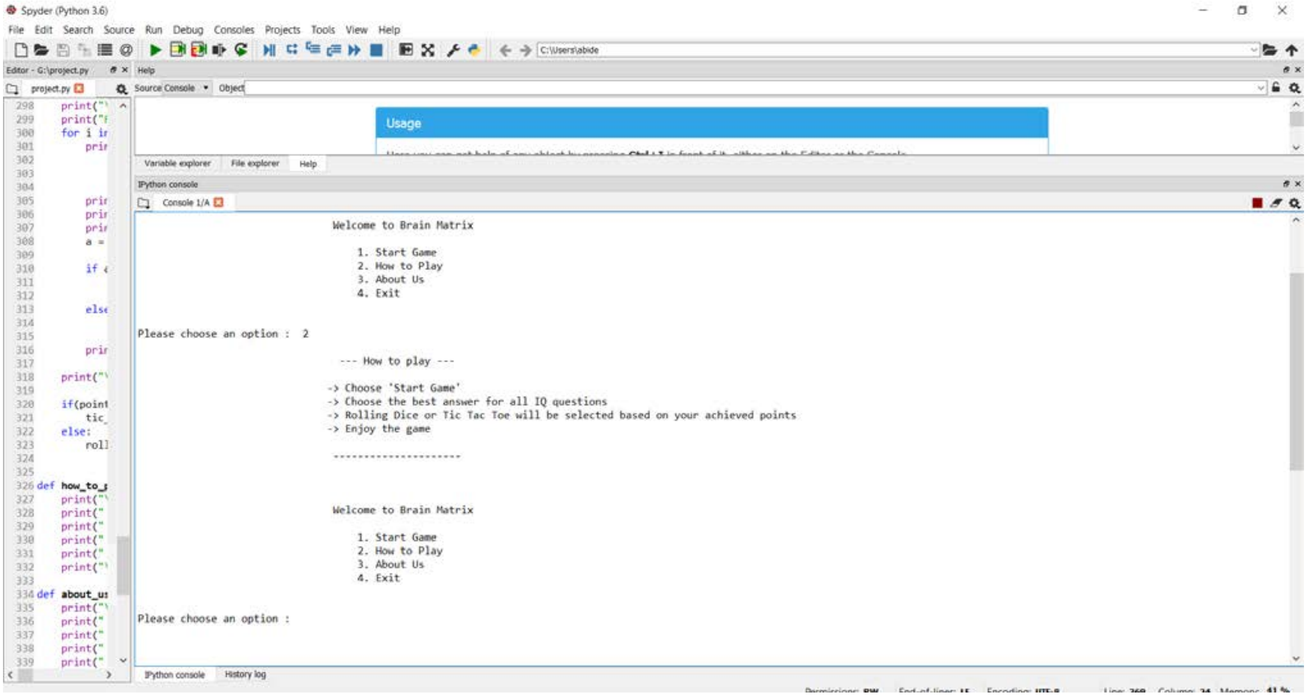
- Use GUI to make game more interesting.
- Add some more games like sudoku, chess etc.
- Try to increase the number of question, meaning mixed the question with beginners, advanced, extreme level of question.
- Try to add some more fields in question.
- Use object-oriented programming to make the code more robust.

6.0 Output:



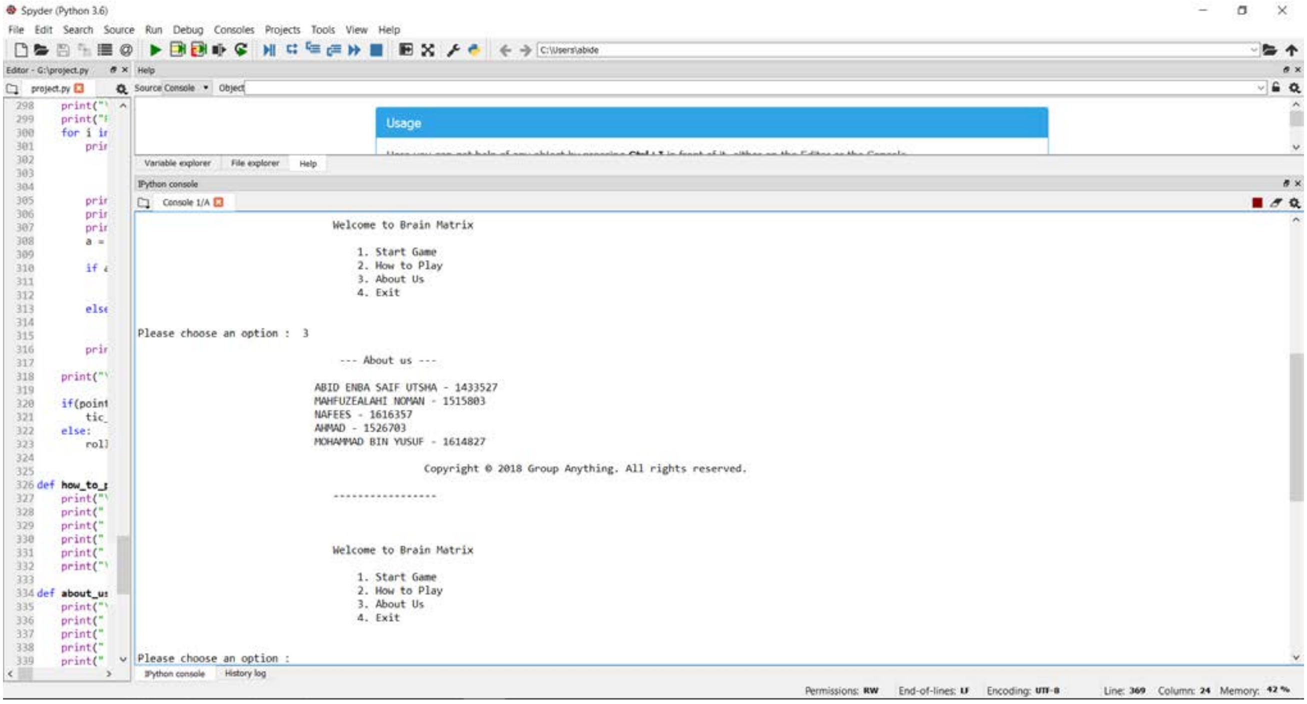
```
Python 3.6.4 |Anaconda, Inc.| (default, Jan 16 2018, 10:22:32) [MSC v.1900 64 bit (AMD64)]
Type "copyright", "credits" or "license" for more information.

IPython 6.2.1 -- An enhanced Interactive Python.

In [1]: runfile('G:/project.py', wdir='G:')


                                Welcome to Brain Matrix

                                    1. Start Game
                                    2. How to Play
                                    3. About Us
                                    4. Exit


Please choose an option :
```

fig 1: showing the main menu



```
                                Welcome to Brain Matrix

                                    1. Start Game
                                    2. How to Play
                                    3. About Us
                                    4. Exit


Please choose an option :  2

                                 --- How to play ---

                               -> Choose 'Start Game'
                               -> Choose the best answer for all IQ questions
                               -> Rolling Dice or Tic Tac Toe will be selected based on your achieved points
                               -> Enjoy the game

                                --------------------



                                Welcome to Brain Matrix

                                    1. Start Game
                                    2. How to Play
                                    3. About Us
                                    4. Exit


Please choose an option :
```

fig 2: How to play



```
                              Welcome to Brain Matrix

                                  1. Start Game
                                  2. How to Play
                                  3. About Us
                                  4. Exit


Please choose an option :  3

                               --- About us ---

                          ABID ENBA SAIF UTSHA - 1433527
                          MAHFUZEALAHI NOMAN - 1515803
                          NAFEES - 1616357
                          AHMAD - 1526703
                          MOHAMMAD BIN YUSUF - 1614827

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                              -----------------



                              Welcome to Brain Matrix

                                  1. Start Game
                                  2. How to Play
                                  3. About Us
                                  4. Exit


Please choose an option :
```
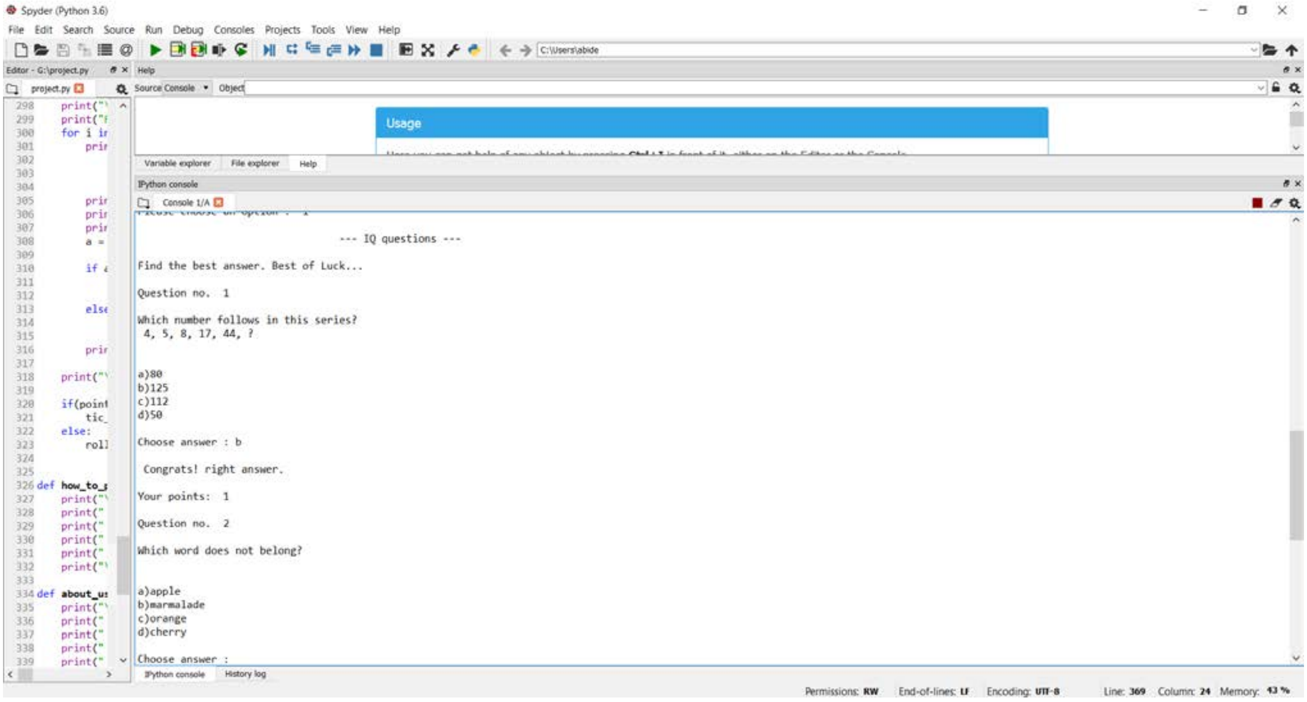
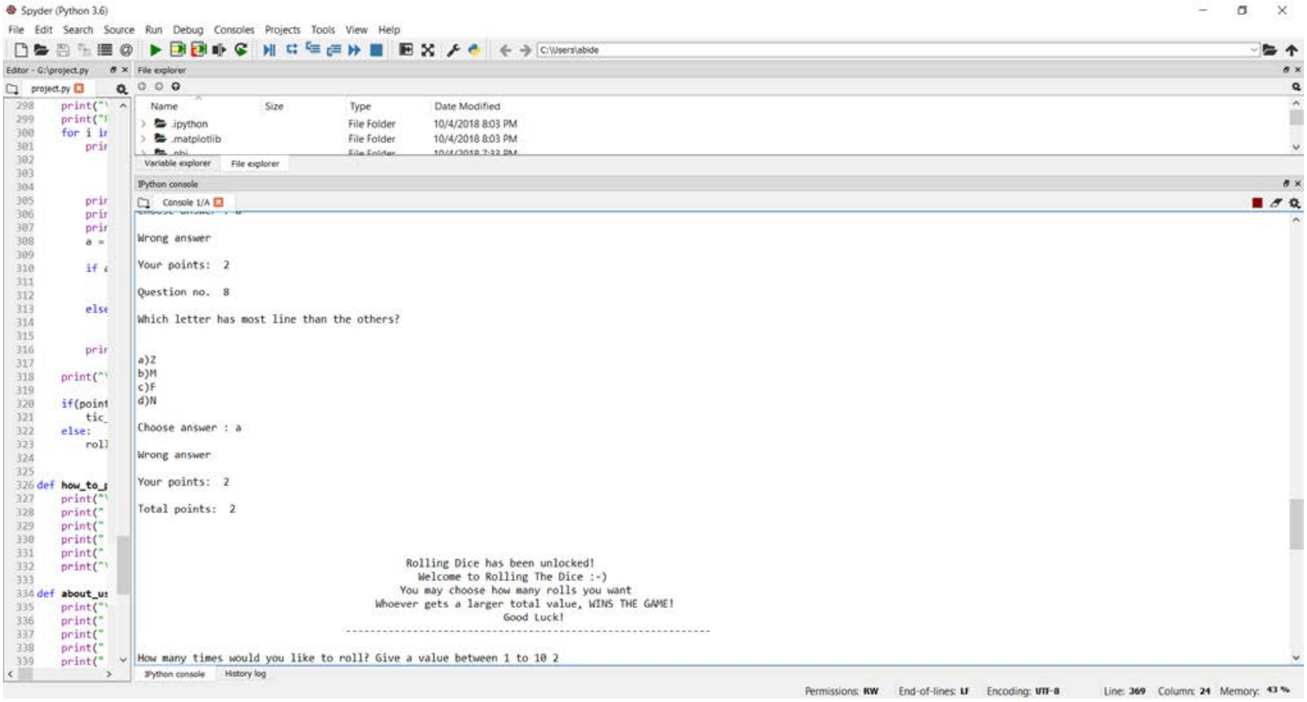

fig 3: About Us



```
                               --- IQ questions ---

Find the best answer. Best of Luck...

Question no.  1

Which number follows in this series?
 4, 5, 8, 17, 44, ?


a)80
b)125
c)112
d)50

Choose answer : b

 Congrats! right answer.

Your points:  1

Question no.  2

Which word does not belong?


a)apple
b)marmalade
c)orange
d)cherry

Choose answer :
```

fig 4: Play game and IQ question


Spyder (Python 3.6)
File Edit Search Source Run Debug Consoles Projects Tools View Help
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project.py
File explorer
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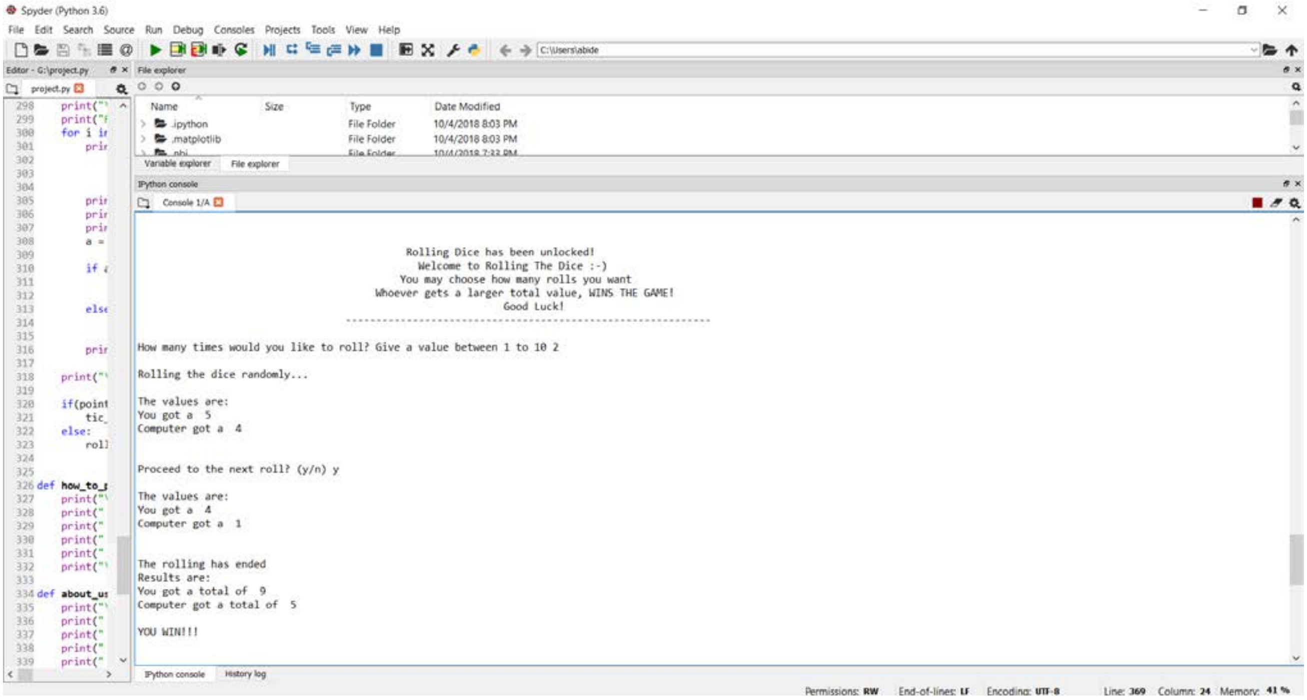
.ipython File Folder 10/4/2018 8:03 PM
.matplotlib File Folder 10/4/2018 8:03 PM
Variable explorer
File explorer
IPython console
Console 1/A
IPython console
History log
Permissions: RW End-of-lines: LF Encoding: UTF-8 Line: 369 Column: 24 Memory: 43 %

```
    print("\
    print("F
    for i ir
        prir



        prir
        prir
        prir
        a =

        if a


        else


        prir

    print("\

    if(point
        tic_
    else:
        rol]

def how_to_p
    print("\
    print("
    print("
    print("
    print("
    print("\

def about_us
    print("\
    print("
    print("
    print("
    print("
```

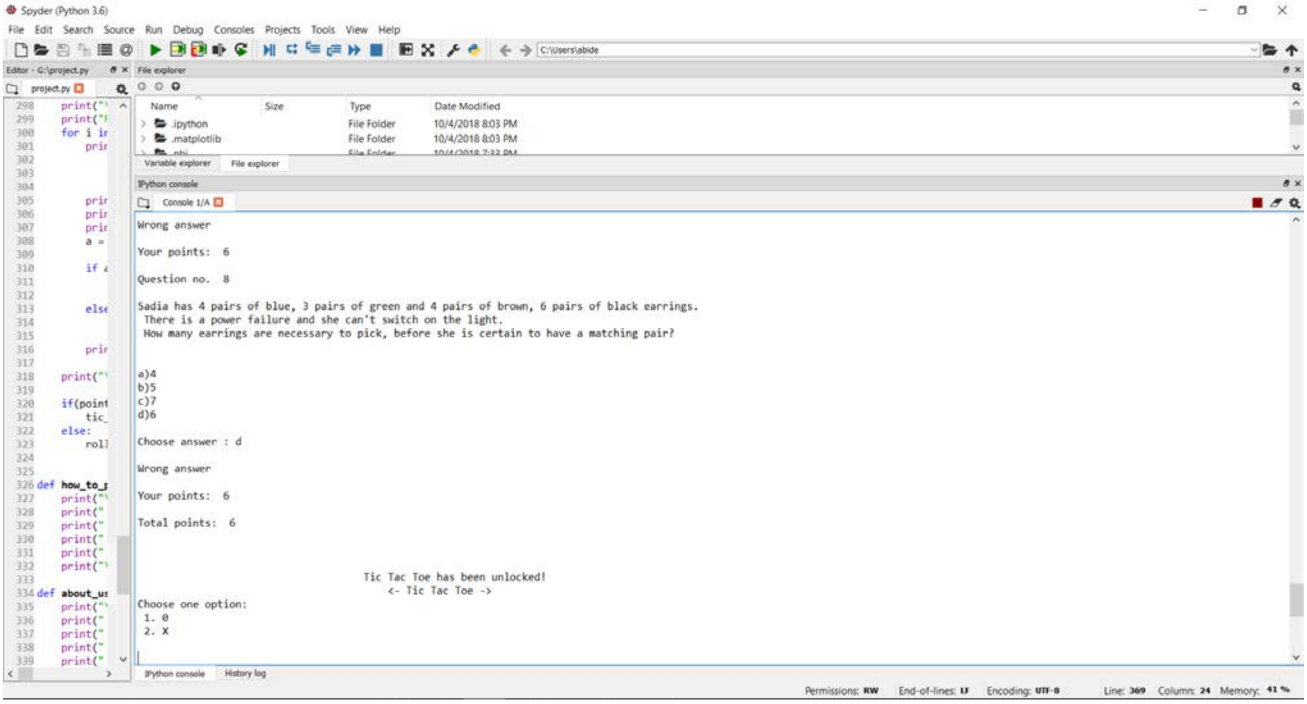
```
Wrong answer

Your points:  2

Question no.  8

Which letter has most line than the others?


a)Z
b)M
c)F
d)N

Choose answer : a

Wrong answer

Your points:  2

Total points:  2



                                   Rolling Dice has been unlocked!
                                    Welcome to Rolling The Dice :-)
                                  You may choose how many rolls you want
                                Whoever gets a larger total value, WINS THE GAME!
                                              Good Luck!
                              -------------------------------------------------------

How many times would you like to roll? Give a value between 1 to 10 2
```

fig 5: Unlock rolling dice


Spyder (Python 3.6)
File Edit Search Source Run Debug Consoles Projects Tools View Help
C:\Users\abide
Editor - G:\project.py
project.py
File explorer
Name Size Type Date Modified
.ipython File Folder 10/4/2018 8:03 PM
.matplotlib File Folder 10/4/2018 8:03 PM
Variable explorer
File explorer
IPython console
Console 1/A
IPython console
History log
Permissions: RW End-of-lines: LF Encoding: UTF-8 Line: 369 Column: 24 Memory: 41 %

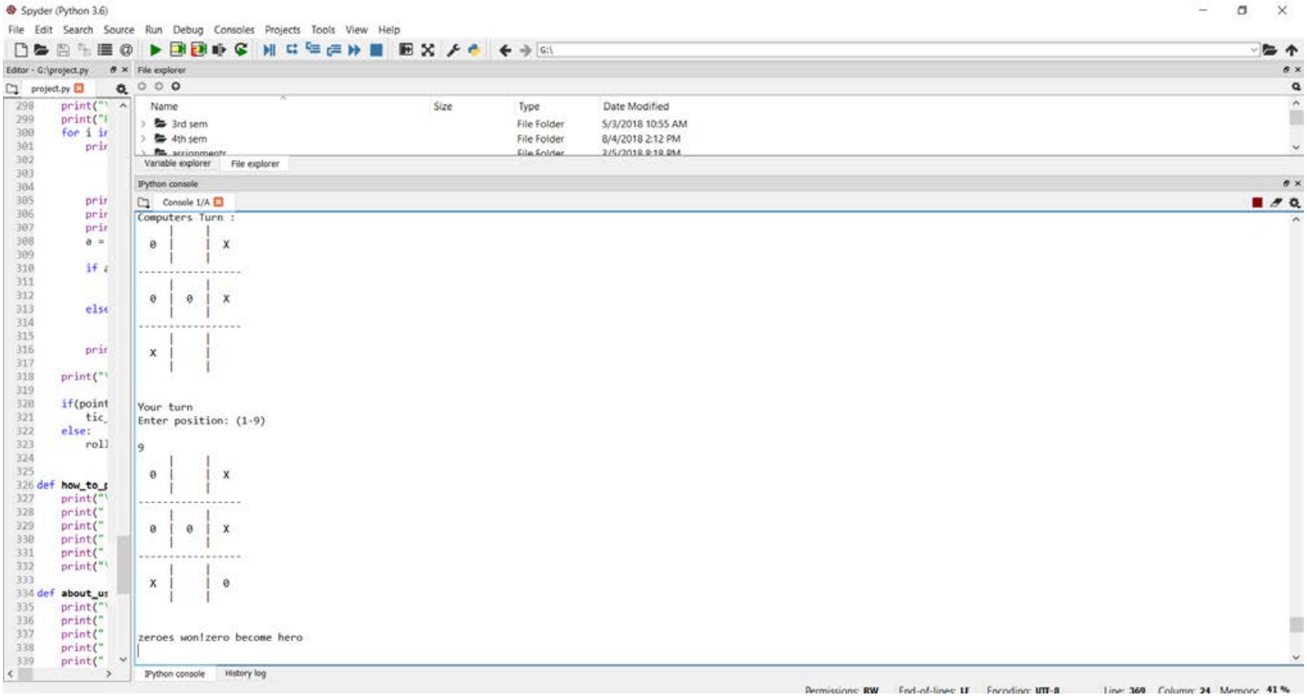
```
                                   Rolling Dice has been unlocked!
                                    Welcome to Rolling The Dice :-)
                                  You may choose how many rolls you want
                                Whoever gets a larger total value, WINS THE GAME!
                                              Good Luck!
                              -------------------------------------------------------

How many times would you like to roll? Give a value between 1 to 10 2

Rolling the dice randomly...

The values are:
You got a  5
Computer got a  4


Proceed to the next roll? (y/n) y

The values are:
You got a  4
Computer got a  1


The rolling has ended
Results are:
You got a total of  9
Computer got a total of  5

YOU WIN!!!
```

fig 6: Playing rolling dice



```
Wrong answer

Your points:  6

Question no.  8

Sadia has 4 pairs of blue, 3 pairs of green and 4 pairs of brown, 6 pairs of black earrings.
 There is a power failure and she can't switch on the light.
 How many earrings are necessary to pick, before she is certain to have a matching pair?


a)4
b)5
c)7
d)6

Choose answer : d

Wrong answer

Your points:  6

Total points:  6



                                Tic Tac Toe has been unlocked!
                                   <- Tic Tac Toe ->
Choose one option:
 1. 0
 2. X
```

fig 7: unlock tic tac toe



```
Computers Turn :
     |     |
  0  |     |  X
     |     |
---------------
     |     |
  0  |  0  |  X
     |     |
---------------
     |     |
  X  |     |
     |     |


Your turn
Enter position: (1-9)

9
     |     |
  0  |     |  X
     |     |
---------------
     |     |
  0  |  0  |  X
     |     |
---------------
     |     |
  X  |     |  0
     |     |


zeroes won!zero become hero
```

fig 8: playing tic tac toe

7.0 Conclusion

When we begin our project, we define our objectives of the project and worked accordingly.

Our plan was to develop a fully functional IQ game, implement the python language effectively. We have developed the game in accordance with the plan. Still, we have further field to improve and more areas to explore. It was an interesting journey learning python language and implement in this project.

Appendix A Coding

```
import sys
import random

def displayBoard(b):             #showing the display for tic tac toe
    print('    |    |')
    print('  ' + b[0] + ' | ' + b[1] + ' | ' + b[2])
    print('    |    |')
    print('-----------------')
    print('    |    |')
    print('  ' + b[3] + ' | ' + b[4] + ' | ' + b[5])
    print('    |    |')
    print('-----------------')
    print('    |    |')
    print('  ' + b[6] + ' | ' + b[7] + ' | ' + b[8])
    print('    |    |')
    print('\n')

def checkWin(b, m):
    return ((b[0] == m and b[1] == m and b[2] == m) or  # H top
            (b[3] == m and b[4] == m and b[5] == m) or  # H mid
            (b[6] == m and b[7] == m and b[8] == m) or  # H bot
            (b[0] == m and b[3] == m and b[6] == m) or  # V left
            (b[1] == m and b[4] == m and b[7] == m) or  # V centre
            (b[2] == m and b[5] == m and b[8] == m) or  # V right
            (b[0] == m and b[4] == m and b[8] == m) or  # LR diag
            (b[2] == m and b[4] == m and b[6] == m))  # RL diag

def checkDraw(b):
    return ' ' not in b

def getBoardCopy(b):
    # Make a duplicate of the board. When testing moves we don't want to
    # change the actual board
    dupeBoard = []
    for j in b:
        dupeBoard.append(j)
    return dupeBoard

def testWinMove(b, mark, i):
    # b = the board
    # mark = 0 or X
    # i = the square to check if makes a win
    bCopy = getBoardCopy(b)
    bCopy[i] = mark
    return checkWin(bCopy, mark)

def getComputerMove(b):
    # Check computer win moves
    print('Computers Turn : ')
    for i in range(0, 9):
        if b[i] == ' ' and testWinMove(b, 'X', i):
            return i
    # Check player win moves
    for i in range(0, 9):
        if b[i] == ' ' and testWinMove(b, '0', i):
            return i
    # Play a corner
    for i in [0, 2, 6, 8]:
        if b[i] == ' ':
            return i
    # Play center
    if b[4] == ' ':
        return 4
    #Play a side
    for i in [1, 3, 5, 7]:
        if b[i] == ' ':
            return i

def testForkMove(b, mark, i):
    # Determines if a move opens up a fork
    bCopy = getBoardCopy(b)
    bCopy[i] = mark
    winningMoves = 0
    for j in range(0, 9):
        if testWinMove(bCopy, mark, j) and bCopy[j] == ' ':
            winningMoves += 1
    return winningMoves >= 2


def tic_tac_toe():
    Playing = True
    while Playing:
        InGame = True
        board = [' '] * 9
        print ("\n\n\n                                Tic Tac Toe has been unlocked!")
        print('                                    <- Tic Tac Toe ->')
        print("Choose one option:")
        print(" 1. 0")
        print(" 2. X")
        if input() == '1':
            playerMarker = '0'
        else:
            playerMarker = 'X'
        displayBoard(board)

        while InGame:
            if playerMarker == '0':
                print("Your turn")
                print('Enter position: (1-9)')
                move = int(input()) - 1
                if board[move] != ' ':
                    print('Invalid move!')
                    continue
            else:
                move = getComputerMove(board)
            board[move] = playerMarker
            if checkWin(board, playerMarker):
                InGame = False
                displayBoard(board)
                if playerMarker == '0':
                    print('zeroes won!zero become hero')
                else:
                    print('Crosses won!')
                continue
            if checkDraw(board):
                InGame = False
                displayBoard(board)
                print('Oh NO!!!!!!! Match draw!')
                continue
            displayBoard(board)
            if playerMarker == '0':
                playerMarker = 'X'
            else:
                playerMarker = '0'



        Playing = False
```

```
def rolling_dice():
    print ("\n\n\n                                        Rolling Dice has been unlocked!")
    print("                                  Welcome to Rolling The Dice :-)")
    print("                                You may choose how many rolls you want")
    print("                                  Whoever gets a larger total value, WINS THE GAME!")
    print("                                            Good Luck!")
    print("                         ------------------------------------------------------------")

    min = 1
    max = 6
    sum1 = 0
    sum2 = 0
    roll = "y"
    player = random.randint(min, max)
    computer = random.randint(min, max)

    num_of_rolls = int(input("How many times would you like to roll? Give a value between 1 to 10 "))

    if num_of_rolls > 10:
        num_of_rolls = int(input("You provided a wrong input. Give a value between 1 to 10 "))
```

```
print("")
print("Rolling the dice randomly...")

for n in range(0, num_of_rolls):
    print("")
    print("The values are: ")
    print("You got a ", player)
    print("Computer got a ", computer)

    sum1 += player
    sum2 += computer

    player = random.randint(min, max)
    computer = random.randint(min, max)

    print("")
    if n < num_of_rolls - 1:
        roll = input("Proceed to the next roll? (y/n) ")

    if roll == "y":
        continue
    else:
        print("")
        print("You have chosen to to exit the game.")
        exit(0)
        print("")

    print("")
    print("The rolling has ended")
    print("Results are:")
    print("You got a total of ", sum1)
    print("Computer got a total of ", sum2)
    print("")

    if sum1 > sum2:
        print("YOU WIN!!!")
    elif sum1 == sum2:
        print("IT'S A DRAW!!!")
    else:
        print("YOU LOSE!!!")

def iq_que():
    # making a questions array with 20 question to ask

    questions = ["What number best completes the analogy \n 8:4 as 10:?",
                "Which number should come next\n 1,1,2,3,5,8,?",
                "'PEACH' is to 'HCAEP' as 46251 is to",
                "At the end of a banquet 10 people shake hands with each other.\n How many handshakes will there be in total?",
                "The day before the day before yesterday is three days after saturday.\n What day is it today?",
                "165135 is to peace as 1215225 is to: ",

                "Find the next number in the following series: \n 15 12 13 10 11 8 ?",

                "Asif was both the 16th highest and 16th lowest in her mid-term exam.\n How many students are in Lisa's class?",

                "Sadia has 4 pairs of blue, 3 pairs of green and 4 pairs of brown, 6 pairs of black earrings. \n There is a power failure and she can't switch on the light.\n How many earrings are necessary to pick, before she is certain to have a matching pair?",

                "Which number follows in this series?\n 4, 5, 8, 17, 44, ?",

                "2 children can build a sandcastle in 3 hours, Susan can build three times as fast as Jane.\n How long will it take Jane to build the castle by herself?",

                "There are 99 participating cars and trucks in an expo. There are 5 more cars than trucks.\n How many cars are there?",

                "Which is the largest fraction?",

                "What is the average of all of the integers from 8 to 44?",

                "Which word does not belong?",

                "Which letter has most line than the others?",

                "Which of the following does not belong?",

                "Which of the following country is currently a constitutional monarchy?",

                "The lower number on a blood pressure reading is?",

                "Basic solution have a pH: ",

                ]


    # making a answer_choices array for showing the answer option to user


    answer_choices = ["a)4\nb)5\nc)10\nd)8",

                 "a)11\nb)8\nc)13\nd)20",
                 "a)64251\nb)15264\nc)15246\nd)46251",
                 "a)100\nb)20\nc)50\nd)45",
                 "a)Monday\nb)Tuesday\nc)Friday\nd)Thursday",
                 "a)LEAD\nb)LOVE\nc)LIKE\nd)LOOP",
                 "a)3\nb)9\nc)12\nd)14",
                 "a)30\nb)31\nc)32\nd)33",
                 "a)4\nb)5\nc)7\nd)6",
                 "a)80\nb)125\nc)112\nd)50",
                 "a)4\nb)8\nc)10\nd)12",
                 "a)50\nb)51\nc)52\nd)53",
                 "a)3/5\nb)5/8\nc)6/11\nd)8/14",
                 "a)22\nb)24\nc)28\nd)26",
                 "a)apple\nb)marmalade\nc)orange\nd)cherry",
                 "a)Z\nb)M\nc)F\nd)N",
                 "a)Iron\nb)Tin\nc)Brass\nd)Lead",
                 "a)Poland\nb)Portugal\nc)Belgium\nd)Finland",
                 "a)Systolic\nb)Diastolic\nc)low\nd)high",
                 "a)7\nb)above 7\nc)4\nd)below 4"
                 ]

    # making another array to store the right option


    correct_choices = ["b",
                 "c",
                 "b",
                 "d",
                         "c",
                         "b",
                         "b",
                         "b",
                         "b",
                         "b",
                         "d",
                         "c",
                         "b",
                         "d",
                         "b",
                         "b",
                         "c",
                         "c",
                         "b",
                         "b",
                         ]

    ran = []
    n = 8
    while n >= 0:          #randomly select 8 question
        r = random.randint(0, 20)
        if r not in ran:
            ran.append(r)
            n = n - 1
```

```
point = 0
print("\n                                --- IQ questions ---\n")
print("Find the best answer. Best of Luck...")
for i in range(0,8):
    print("\nQuestion no. ", i+1, "\n")




    print(questions[ran[i]])
    print ("\n")
    print(answer_choices[ran[i]])
    a = input("Choose answer : ")

    if a == correct_choices[ran[i]]:
        print("\n Congrats! right answer.")
        point = point + 1
    else:
        print("\nWrong answer")

    print("\nYour points: ", point)

print("\nTotal points: ", point)

if(point > 4):            # assigning tic tac toe
    tic_tac_toe()
    else:
        rolling_dice()        # assigning rolling dice



def how_to_play():
    print("\n                              --- How to play --- \n")
    print("                              -> Choose 'Start Game'")
    print("                              -> Choose the best answer for all IQ questions")
    print("                                 -> Rolling Dice or Tic Tac Toe will be selected based on your achieved points")
    print("                              -> Enjoy the game")
    print("\n                             --------------------- \n")


def about_us():
    print("\n                              --- About us ---\n")
    print("                            ABID ENBA SAIF UTSHA - 1433527")
    print("                            MAHFUZEALAHI NOMAN - 1515803")
    print("                            NAFEES - 1616357")
    print("                            AHMAD - 1526703")
    print("                            MOHAMMAD BIN YUSUF - 1614827")
    print("\n                                                Copyright © 2018 Group Anything. All rights reserved.")
    print("\n                             -----------------\n")


def menu():
    opt = True
    while opt:
        print("\n")
        print("                                Welcome to Brain Matrix\n")
        print("                                    1. Start Game")
        print("                                    2. How to Play")
        print("                                    3. About Us")
        print("                                    4. Exit")
        opt = choice()



def choice():
    opt = True
    while opt:
        argument = input("\nPlease choose an option :  ")
        if argument == '1':
            opt = False
            iq_que()
            return True
        elif argument == '2':
            opt = False
            how_to_play()
            return True
        elif argument == '3':
            opt = False
            about_us()
            return True
        elif argument == '4':
            print("                                    Thank You for playing!")
            sys.exit()
        else:
            print("\n                                !!! Invalid option !!!\n")



menu()
```