EAST WEST UNIVERSITY

Mini Project

CSE-366

Sec-02

Submitted to:

Md Al-Imran
Lecturer
Department of Computer Science & Engineering

Submitted by:

Name: Hasib Ar Rafiul Fahim
ID: 2019-1-60-036

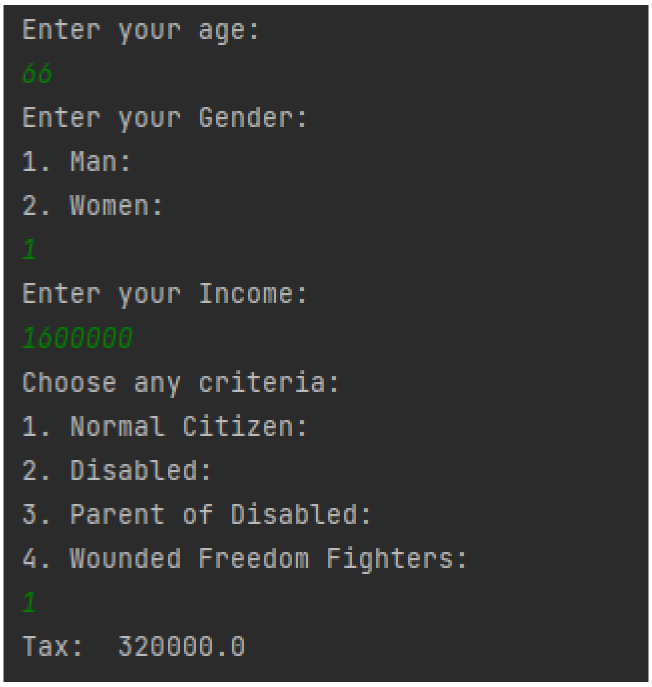
1. Income tax calculator

Code

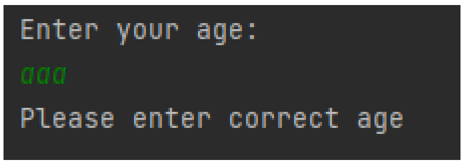
```python
def normalCitizen(income):
    if 1 <= income <= 300000:
        print("Tax: ", (income*0))
    elif 300001 <= income <= 400000:
        print("Tax: ", (income*0.05))
    elif 400001 <= income <= 700000:
        print("Tax: ", (income*0.1))
    elif 700001 <= income <= 1100000:
        print("Tax: ", (income*0.15))
    elif 1100001 <= income <= 1600000:
        print("Tax: ", (income*0.2))
    else:
        print("Tax: ", (income*0.25))


def womenAndCitizenWithAgeGreaterThen65(income):
    if 1 <= income <= 350000:
        print("Tax: ", (income*0))
    elif 350001 <= income <= 450000:
        print("Tax: ", (income*0.05))
    elif 450001 <= income <= 750000:
        print("Tax: ", (income*0.1))
    elif 750001 <= income <= 1150000:
        print("Tax: ", (income*0.15))
    elif 1150001 <= income <= 1650000:
        print("Tax: ", (income*0.2))
    else:
        print("Tax: ", (income*0.25))


def Disabled(income):
    if 1 <= income <= 450000:
        print("Tax: ", (income*0))
    elif 450001 <= income <= 550000:
        print("Tax: ", (income*0.05))
    elif 550001 <= income <= 850000:
        print("Tax: ", (income*0.1))
    elif 850001 <= income <= 1250000:
        print("Tax: ", (income*0.15))
    elif 1250001 <= income <= 1750000:
        print("Tax: ", (income*0.2))
    else:
        print("Tax: ", (income*0.25))


def parentsOfDisabled(income):
    if 1 <= income <= 350000:
        print("Tax: ", (income*0.0))
    elif 350001 <= income <= 450000:
        print("Tax: ", (income*0.05))
    elif 450001 <= income <= 750000:
        print("Tax: ", (income*0.1))
    elif 750001 <= income <= 1150000:
        print("Tax: ", (income*0.15))
    elif 1150001 <= income <= 1650000:
        print("Tax: ", (income*0.20))
    else:
        print("Tax: ", (income*0.25))


def woundedFreedomFighters(income):
    if 1 <= income <= 475000:
        print("Tax: ", (income*0.0))
    elif 475001 <= income <= 575000:
        print("Tax: ", (income*0.05))
    elif 575001 <= income <= 875000:
        print("Tax: ", (income*0.1))
    elif 875001 <= income <= 1275000:
        print("Tax: ", (income*0.15))
    elif 1275001 <= income <= 1775000:
        print("Tax: ", (income*0.20))
    else:
        print("Tax: ", (income*0.25))


def main():
    while True:
        print("Enter your age: ")
        try:
            age = int(input())
        except ValueError:
            print("Please enter correct age")
            break

        print("Enter your Gender: ")
        print("1. Man: ")
        print("2. Women: ")
        try:
            gender = int(input())
        except ValueError:
            print("Please enter correct Gender")
            continue
        if gender != 1 and gender != 2:
            print("Please Enter 1 or 2")
            break

        print("Enter your Income: ")
        try:
            income = float(input())
        except ValueError:
            print("Please enter correct income")
            break

        print("Choose any criteria: ")
        print("1. Normal Citizen: ")
        print("2. Disabled: ")
        print("3. Parent of Disabled: ")
        print("4. Wounded Freedom Fighters: ")
        try:
            criteria = int(input())
        except ValueError:
            print("Please enter correct criteria")
            break

        if age > 65 or gender == 2:
            womenAndCitizenWithAgeGreaterThen65(income)
        else:
```

```python
            if criteria == 1:
                normalCitizen(income)

            elif criteria == 2:
                Disabled(income)

            elif criteria == 3:
                parentsOfDisabled(income)

            elif criteria == 4:
                woundedFreedomFighters(income)

            else:
                print("Wrong Input")
        break


main()
```

Output:



```
Enter your age:
66
Enter your Gender:
1. Man:
2. Women:
1
Enter your Income:
1600000
Choose any criteria:
1. Normal Citizen:
2. Disabled:
3. Parent of Disabled:
4. Wounded Freedom Fighters:
1
Tax:  320000.0
```

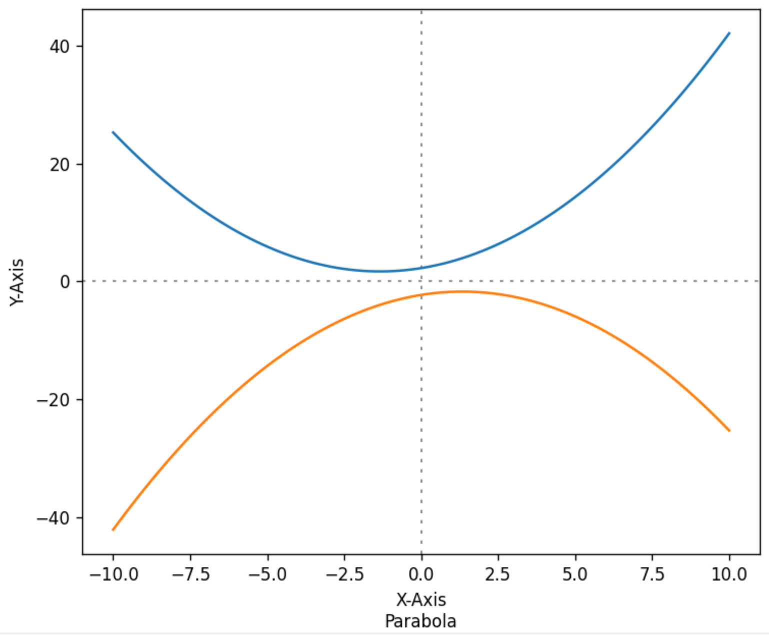


```
Enter your age:
aaa
Please enter correct age
```

2. Plotting
Code with Explanation

```
import matplotlib.pyplot as plt
import numpy as np
# some imports to plot an equation


def f(x):
    return (0.3139 * x ** 2) + (0.8402 * x) + 2.2701
    # This is the equation I got after plotting the given first curve


def f2(x):
    return (-(0.3139 * x ** 2)) + (0.8402 * x) - 2.2701
    # This is the equation I got after plotting the given second
       curve which is opposite of the first one


xlist = np.linspace(-10, 10, num=100)    # list of x values
xlist2 = np.linspace(-10, 10, num=100)    # list of x values for
second curve
ylist = f(xlist)    # list of y values after calculating from the
equation
ylist2 = f2(xlist2)    # list of y values for second curve after
calculating from the equation


plt.figure(num=0, dpi=120)    # this determine the figure number and
display pixels
plt.axhline(0, color='black', alpha=0.5, dashes=[2, 4], linewidth=1)
plt.axvline(0, color='black', alpha=0.5, dashes=[2, 4], linewidth=1)
plt.xlabel('X-Axis' + '\n' + 'Parabola')    # axis level
plt.ylabel('Y-Axis')
plt.plot(xlist, ylist)    # plotting the first curve
plt.plot(xlist2, ylist2)    # plotting the second curve
plt.show()    # showing the plot on pyCharm
```

Plot:

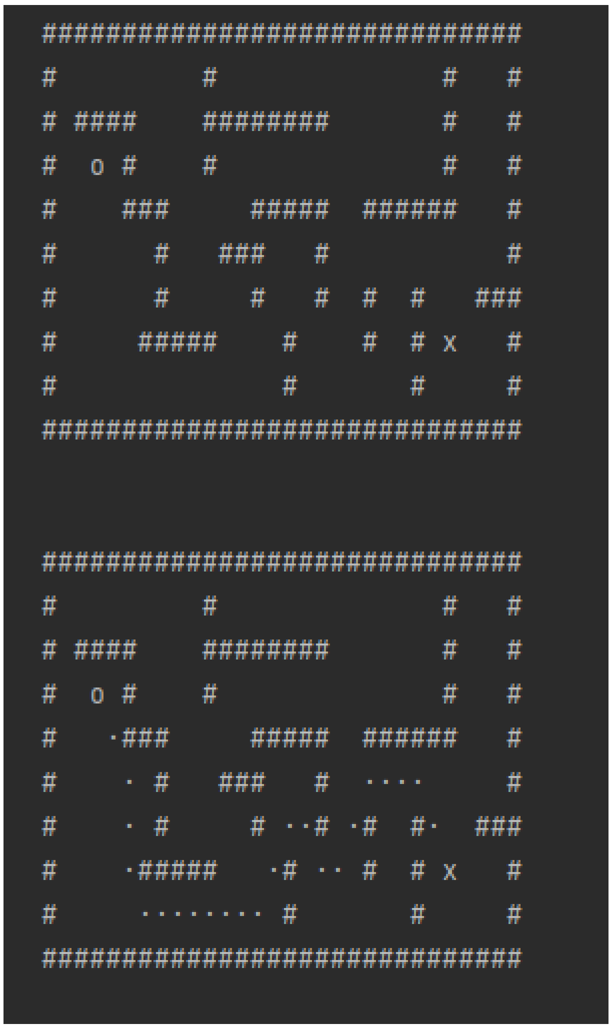


3. Maze Solver Code

```python
import math
from simpleai.search import SearchProblem, astar


# this methode will solve the maze
class MazeSolver(SearchProblem):
    def __init__(self, board):
        self.board = board
        self.goal = (0, 0)

        for y in range(len(self.board)):
            for x in range(len(self.board[y])):
                if self.board[y][x].lower() == "o":
                    self.initial = (x, y)
                elif self.board[y][x].lower() == "x":
                    self.goal = (x, y)

        super(MazeSolver, self).__init__(initial_state=self.initial)

    # searching the solution
    def actions(self, state):
        actions = []
        for action in COSTS.keys():
            newx, newy = self.result(state, action)
            if self.board[newy][newx] != "#":
                actions.append(action)

        return actions

    # Update maze location
    def result(self, state, action):
        x, y = state

        if action.count("up"):
            y -= 1
        if action.count("down"):
            y += 1
        if action.count("left"):
            x -= 1
        if action.count("right"):
            x += 1

        new_state = (x, y)

        return new_state

    # Check if we have reached the goal
    def is_goal(self, state):
        return state == self.goal

    # cost calculation
    def cost(self, state, action, state2):
        return COSTS[action]

    # Heuristic values
    def heuristic(self, state):
        x, y = state
        gx, gy = self.goal
        return math.sqrt((x - gx) ** 2 + (y - gy) ** 2)


# converting the maze
def convert(MAP):
    return [list(x) for x in MAP.split("\n") if x]


# printing the maze
def printMaze(MAP):
    for y in range(len(MAP)):
        for x in range(len(MAP[y])):
            if (x, y) == problem.initial:
                print('o', end='')
            elif (x, y) == problem.goal:
                print('x', end='')
            elif (x, y) in path:
                print('·', end='')
            else:
                print(MAP[y][x], end='')

        print()


# here is the map
MAP = """
    ##############################
    #         #              #   #
    # ####    ########       #   #
    #  o #    #              #   #
    #    ###     #####  ######   #
    #      #   ###   #           #
    #      #     #   #  #  #   ###
    #     #####    #    #  # x   #
    #              #       #     #
    ##############################
    """


# Convert map to a list
print(MAP)
MAP = convert(MAP)

# given movement cost
cost_regular = 1.0
cost_diagonal = 1.7

# Create the cost dictionary
COSTS = {
    "up": cost_regular,
    "down": cost_regular,
    "left": cost_regular,
    "right": cost_regular,
    "up left": cost_diagonal,
    "up right": cost_diagonal,
    "down left": cost_diagonal,
    "down right": cost_diagonal,
}

# Create maze solver object
problem = MazeSolver(MAP)
```

```
# Run the solver
result = astar(problem, graph_search=True)

# Extract the path
path = [x[1] for x in result.path()]

# Print the result
print()
printMaze(MAP)
```

Output



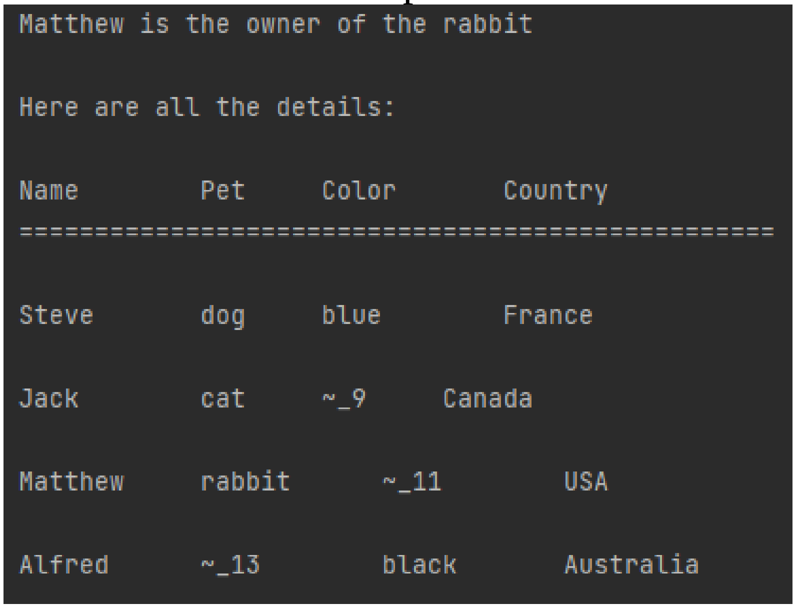
```
##############################
#         #              #   #
# ####    ########       #   #
#  o #    #              #   #
#    ###     #####  ######   #
#      #   ###   #           #
#      #     #   #  #  #   ###
#     #####    #    #  # x   #
#              #       #     #
##############################


##############################
#         #              #   #
# ####    ########       #   #
#  o #    #              #   #
#   ·###     #####  ######   #
#    · #   ###   #  ····     #
#    · #     # ··# ·#  #·  ###
#    ·#####   ·# ·· #  # x   #
#     ········ #       #     #
##############################
```

4. Logic Program

Code

```python
from logpy import *
from logpy.core import lall

people = var()
# we import rules given on the questions
rules = lall(
    (eq, (var(), var(), var(), var()), people),
    (membero, ('Steve', var(), 'blue', var()), people),
    (membero, (var(), 'cat', var(), 'Canada'), people),
    (membero, ('Matthew', var(), var(), 'USA'), people),
    (membero, (var(), var(), 'black', 'Australia'), people),
    (membero, ('Jack', 'cat', var(), var()), people),
    (membero, ('Alfred', var(), var(), 'Australia'), people),
    (membero, (var(), 'dog', var(), 'France'), people),
    (membero, (var(), 'rabbit', var(), var()), people)
)

output = 0
# we find the solution by passing the values ro run() function
solutions = run(0, people, rules)
for house in solutions[0]:
    if 'rabbit' in house:
        output = house[0]

# now we print the output result
print('\n' + output + ' is the owner of the rabbit')
# now we print all the details that were retrieved from logic
programming
print('\nHere are all the details:')
attributes = ['Name', 'Pet', 'Color', 'Country']
print('\n' + '\t\t'.join(attributes))
print('=' * 50)
for item in solutions[0]:
    print('')
    print('\t\t'.join([str(x) for x in item]))
```

Output



```
Matthew is the owner of the rabbit

Here are all the details:

Name        Pet     Color       Country
==================================================


Steve       dog     blue        France

Jack        cat     ~_9     Canada

Matthew     rabbit      ~_11        USA

Alfred      ~_13        black       Australia
```