1. Implement a class iterator to flatten a nested list of lists of integers. Each list element is either an integer or a list. There can be many levels of nested lists in lists.

The class initializes with a nested list. It also has two methods:

next() returns an integer in the order of appearance.

hasNext() returns True / False regarding if all integers have been retrieved or not.

Write the Class implementation for three required methods.

Examples:

ni, actual = NestedIterator([[1, 1], 2, [1, 1]]), []

while ni.hasNext():

actual.append(ni.next())

actual ➞ [1, 1, 2, 1, 1]

ni, actual = NestedIterator([1, [4, [6]]]), []

while ni.hasNext():

actual.append(ni.next())

actual ➞ [1, 4, 6]

ni, actual = NestedIterator([[[]], []]), []

while ni.hasNext():

actual.append(ni.next())

actual ➞ []

class NestedIterator:

def \_\_init\_\_(self,in\_list):

self.list = in\_list

self.flatten\_list = []

self.test(self.list)

def test(self,in\_list):

for ele in in\_list:

if isinstance(ele,int):

self.flatten\_list.append(ele)

else:

self.test(ele)

def hasNext(self):

return True if len(self.flatten\_list) > 0 else False

def next(self):

return self.flatten\_list.pop(0)

ni, actual = NestedIterator([[1, 1], 2, [1, 1]]), []

while ni.hasNext():

actual.append(ni.next())

print(f'actual ➞ {actual}')

ni, actual = NestedIterator([1, [4, [6]]]), []

while ni.hasNext():

actual.append(ni.next())

print(f'actual ➞ {actual}')

ni, actual = NestedIterator([[[]], []]), []

while ni.hasNext():

actual.append(ni.next())

print(f'actual ➞ {actual}')

actual ➞ [1, 1, 2, 1, 1]

actual ➞ [1, 4, 6]

actual ➞ []

2. Given a 3x3 matrix of a completed tic-tac-toe game, create a function that returns whether the game is a win for "X", "O", or a "Draw", where "X" and "O" represent themselves on the matrix, and "E" represents an empty spot.

Examples:

tic\_tac\_toe([

["X", "O", "X"],

["O", "X", "O"],

["O", "X", "X"]

]) ➞ "X"

tic\_tac\_toe([

["O", "O", "O"],

["O", "X", "X"],

["E", "X", "X"]

]) ➞ "O"

tic\_tac\_toe([

["X", "X", "O"],

["O", "O", "X"],

["X", "X", "O"]

]) ➞ "Draw"

def tic\_tac\_toe(in\_list):

output = None

# Case 1 to search for horizontal match

for ele in in\_list:

if len(list(set(ele))) == 1:

output = list(set(ele))[0]

break

# Case 2 to search for vertical match

if output == None:

for i in range(len(in\_list)):

temp = []

for j in range(len(in\_list)): temp.append(in\_list[j][i])

if len(list(set(temp))) == 1: output = list(set(temp))[0]

# Case 3 to search for diagonal match

if output == None:

temp = []

for ele in [0,1,2]:

temp.append(in\_list[ele][ele])

if len(list(set(temp))) == 1: output = list(set(temp))[0]

# Case 4 to search for reverse diagonal match

if output == None:

temp = []

for i in [0,1,2]:

for j in [0,1,2]:

if sum([i,j]) == 2: temp.append(in\_list[i][j])

if len(list(set(temp))) == 1: output = list(set(temp))[0]

# Case 5 Draw Condition

if output == None: output = 'Draw'

print(f'tic\_tac\_toe({in\_list}) ➞ "{output}"')

tic\_tac\_toe([["X", "O", "X"],["O", "X", "O"],["O", "X", "X"]])

tic\_tac\_toe([["O", "O", "O"],["O","X", "X"],["E", "X", "X"]])

tic\_tac\_toe([["X", "X", "O"],["O", "O", "X"],["X", "X", "O"]])

tic\_tac\_toe([["X", "X", "O"],["X", "O", "X"],["X", "O", "O"]])

tic\_tac\_toe([["O", "O", "X"],["O", "X", "O"],["X", "O", "O"]])

tic\_tac\_toe([['X', 'O', 'X'], ['O', 'X', 'O'], ['O', 'X', 'X']]) ➞ "X"

tic\_tac\_toe([['O', 'O', 'O'], ['O', 'X', 'X'], ['E', 'X', 'X']]) ➞ "O"

tic\_tac\_toe([['X', 'X', 'O'], ['O', 'O', 'X'], ['X', 'X', 'O']]) ➞ "Draw"

tic\_tac\_toe([['X', 'X', 'O'], ['X', 'O', 'X'], ['X', 'O', 'O']]) ➞ "X"

tic\_tac\_toe([['O', 'O', 'X'], ['O', 'X', 'O'], ['X', 'O', 'O']]) ➞ "X"

3. Your computer might have been infected by a virus! Create a function that finds the viruses in files and removes them from your computer.

Examples:

remove\_virus("PC Files: spotifysetup.exe, virus.exe, dog.jpg") ➞ "PC Files: spotifysetup.exe, dog.jpg"

remove\_virus("PC Files: antivirus.exe, cat.pdf, lethalmalware.exe, dangerousvirus.exe ") ➞ "PC Files: antivirus.exe, cat.pdf" remove\_virus("PC Files: notvirus.exe, funnycat.gif") ➞ "PC Files: notvirus.exe, funnycat.gif")

import re

def remove\_virus(in\_string):

in\_list = [x.strip() for x in re.split(", ",in\_string)]

output = []

for ele in in\_list:

if ele not in ['virus.exe','dangerousvirus.exe','lethalmalware.exe']:

output.append(ele)

print(f'remove\_virus({in\_string}) ➞ "{", ".join(output)}"')

remove\_virus("PC Files: spotifysetup.exe, virus.exe, dog.jpg")

remove\_virus("PC Files: antivirus.exe, cat.pdf, lethalmalware.exe, dangerousvirus.exe ")

remove\_virus("PC Files: notvirus.exe, funnycat.gif")

remove\_virus(PC Files: spotifysetup.exe, virus.exe, dog.jpg) ➞ "PC Files: spotifysetup.exe, dog.jpg"

remove\_virus(PC Files: antivirus.exe, cat.pdf, lethalmalware.exe, dangerousvirus.exe ) ➞ "PC Files: antivirus.exe, cat.pdf"

remove\_virus(PC Files: notvirus.exe, funnycat.gif) ➞ "PC Files: notvirus.exe, funnycat.gif"

4. In a video game, a meteor will fall toward the main character's home planet. Given the meteor's trajectory as a string in the form y = mx + b and the character's position as a tuple of (x, y), return True if the meteor will hit the character and False if it will not.

Examples:

will\_hit("y = 2x - 5", (0, 0)) ➞ False

will\_hit("y = -4x + 6", (1, 2)) ➞ True

will\_hit("y = 2x + 6", (3, 2)) ➞ False

def will\_hit(in\_eq,in\_loc):

in\_eq\_list = in\_eq.split(" ")

temp\_list = []

for ele in in\_eq\_list:

if 'x' in ele or 'y'in ele:

if len(ele) == 1:

temp\_list.append(ele.replace('x',str(in\_loc[0]))) if 'x' in ele else temp\_list.append(ele.replace('y',str(in\_loc[1])))

else:

temp\_list.append(ele.replace('x',f'\*{in\_loc[0]}')) if 'x' in ele else temp\_list.append(ele.replace('y',f'\*{in\_loc[1]}'))

else:

temp\_list.append("==") if ele == "=" else temp\_list.append(ele)

print(f'will\_hit{in\_eq,in\_loc} ➞ {eval(" ".join(temp\_list))}')

will\_hit("y = 2x - 5", (0, 0))

will\_hit("y = -4x + 6", (1, 2))

will\_hit("y = 2x + 6", (3, 2))

will\_hit('y = 2x - 5', (0, 0)) ➞ False

will\_hit('y = -4x + 6', (1, 2)) ➞ True

will\_hit('y = 2x + 6', (3, 2)) ➞ False