# Assignment 24

##### 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:

1. next() returns an integer in the order of appearance.
2. hasNext() returns True / False regarding if all integers have been retrieved or not.

Write the Class implementation for three required methods.

**Answer:**

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.

**Answer:**

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.

**Answer:**

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.

**Answer:**

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