Quiz 4: Abstract Data Types

Read the code for the function **unravel**.

```
1  def unravel(nested: list) -> None:
2      """Print elements of <L> and its nested sub-lists in "level order".
3      """
4      q = Queue()
5      for e in nested:
6          q.enqueue(e)
7
8      while not q.is_empty():
9          i = q.dequeue()
10         if not isinstance(i, list):
11             print(i)
12         else:
13             for e in i:
14                 q.enqueue(e)
```

For this quiz, when asked to draw the state of a queue, draw it with the front labeled, and queue elements separated by arrows. For example, if we enqueue 10, then 20, then 30, draw the queue like this: front $\rightarrow$ 10 $\rightarrow$ 20 $\rightarrow$ 30

You may write front $\rightarrow$ only once and omit it afterwards. This is to show that you know which side is the front of the queue.

Consider the following code snippet that uses a queue:

```
1 >>> L = ['a', ['b', ['c', 'd'], 'e', 'f'], ['g', 'h', 'i'], 'j']
2 >>> unravel(L)
```

1. Draw the state of **q** during the function call `unravel(L)` at line 7 in **unravel**.

   'a' -> ['b', ['c', 'd'], 'e', 'f'] -> ['g', 'h', 'i'] -> 'j'

2. For each iteration of the `while` loop in `unravel`, write/draw two things:

   (i) What, if any, output is printed at line 11.

   (ii) The state of `q` at the *end* of the iteration (right after line 15).

Output (if any)	State of **q**
'a'	['b', ['c', 'd'], 'e', 'f'] -> ['g', 'h', 'i'] -> 'j'
	['g', 'h', 'i'] -> 'j' -> 'b' -> ['c', 'd'] -> 'e' -> 'f'
	'j' -> 'b' -> ['c', 'd'] -> 'e' -> 'f' -> 'g' -> 'h' -> 'i'
'j'	'b' -> ['c', 'd'] -> 'e' -> 'f' -> 'g' -> 'h' -> 'i'
'b'	['c', 'd'] -> 'e' -> 'f' -> 'g' -> 'h' -> 'i'
	'e' -> 'f' -> 'g' -> 'h' -> 'i' -> 'c' -> 'd'
'e'	'f' -> 'g' -> 'h' -> 'i' -> 'c' -> 'd'
'f'	'g' -> 'h' -> 'i' -> 'c' -> 'd'
'g'	'h' -> 'i' -> 'c' -> 'd'
'h'	'i' -> 'c' -> 'd'
'i'	'c' -> 'd'
'c'	'd'
'd'	