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[NPTEL \(https://swayam.gov.in/explorer?ncCode=NPTEL\)](https://swayam.gov.in/explorer?ncCode=NPTEL) » **Programming, Data Structures And Algorithms**
**Using Python (course)**

Announcements (announcements)

**About the Course** ([https://swayam.gov.in/nd1\\_noc19\\_cs40/preview](https://swayam.gov.in/nd1_noc19_cs40/preview))    Ask a Question (forum)

Progress (student/home)    Mentor (student/mentor)

## Week 4 Programming Assignment

**Due on 2019-08-29, 23:59 IST**

Write two Python functions as specified below. Paste the text for both functions together into the submission window. Your function will be called automatically with various inputs and should return values as specified. Do not write commands to read any input or print any output.

- You may define additional auxiliary functions as needed.
- In all cases you may assume that the value passed to the function is of the expected type, so your function does not have to check for malformed inputs.
- For each function, there are normally some public test cases and some (hidden) private test cases.
- "Compile and run" will evaluate your submission against the public test cases.
- "Submit" will evaluate your submission against the hidden private test cases. There are 10 private test cases, with equal weightage. You will get feedback about which private test cases pass or fail, though you cannot see the actual test cases.
- Ignore warnings about "Presentation errors".

1. Write a Python function `frequency(l)` that takes as input a list of integers and returns a pair of the form `(minfreqlist,maxfreqlist)` where
  - `minfreqlist` is a list of numbers with minimum frequency in `l`, sorted in ascending order
  - `maxfreqlist` is a list of numbers with maximum frequency in `l`, sorted in ascending

For instance

```
>>> frequency([13,12,11,13,14,13,7,11,13,14,12])
```

 Course  
outline

 How to access  
the portal

 Week 1:  
Introduction

Week 1 Quiz

 Week 2: Basics  
of Python

Week 2 Quiz

 Week 2  
Programming  
Assignment

 Week 3: Lists,  
inductive  
function  
definitions,  
sorting

 Week 3  
Programming  
Assignment

**Week 4: Sorting, Tuples, Dictionaries, Passing Functions, List Comprehension**

**Week 4 Quiz**

**Week 4 Programming Assignment**

- Week 4 Programming Assignment**  
(/noc19\_cs40/progassignment?name=93)

**Week 5: Exception handling, input/output, file handling, string processing**

**Week 5 Programming Assignment**

**Week 6: Backtracking, scope, data structures; stacks, queues and heaps**

**Week 6 Quiz**

**Week 7: Classes, objects and user defined datatypes**

**Week 7 Quiz**

**Week 8: Dynamic programming, wrap-up**

**Week 8 Programming Assignment**

```

([7], [13])

>>> frequency([13,12,11,13,14,13,7,11,13,14,12,14,14])
([7], [13, 14])

>>> frequency([13,12,11,13,14,13,7,11,13,14,12,14,14,7])
([7, 11, 12], [13, 14])

```

2. An airline has assigned each city that it serves a unique numeric code. It has collected information about all the direct flights it operates, represented as a list of pairs of the form (i,j), where i is the code of the starting city and j is the code of the destination.

It now wants to compute all pairs of cities connected by one intermediate hop --- city i is connected to city j by one intermediate hop if there are direct flights of the form (i,k) and (k,j) for some other city k. The airline is only interested in one hop flights between different cities --- pairs of the form (i,i) are not useful.

Write a Python function onehop(l) that takes as input a list of pairs representing direct flights, as described above, and returns a list of all pairs (i,j), where i != j, such that i and j are connected by one hop. Note that it may already be the case that there is a direct flight from i to j. So long as there is an intermediate k with a flight from i to k and from k to j, the list returned by the function should include (i,j). The input list may be in any order. The pairs in the output list should be in lexicographic (dictionary) order. Each pair should be listed exactly once.

For instance

```

>>> onehop([(2,3),(1,2)])
[(1,3)]

>>> onehop([(2,3),(1,2),(3,1),(1,3),(3,2),(2,4),(4,1)])
[(1,2),(1,3),(1,4),(2,1),(3,2),(3,4),(4,2),(4,3)]

>>> onehop([(1,2),(3,4),(5,6)])
[]

```

**Sample Test Cases**

	Input	Output
Test Case 1	frequency([17322,271898,374,374,374,423432423,423432423,423432423,423432423,423432423,5325,5325,5325,5325,5325])	[(17322, 271898), [5325]]
Test Case 2	frequency([17322,374,17322,374,17322,374,17322,374])	[(374, 17322), [374, 17322]]

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**Online Programming Test - Sample**

**Online Programming Test 1, 26 Sep 2019, 09:30-11:30**

**Online Programming Test 2, 26 Sep 2019, 20:00-22:00**

Test Case 3	<code>frequency([9842])</code>	<code>([9842], [9842])</code>
Test Case 4	<code>frequency([-17322, -271898, -374, -374, -374, -423432423, -423432423, -423432423, -423432423, -5325, -5325, -5325, -5325, -5325])</code>	<code>([-271898, -17322], [-5325])</code>
Test Case 5	<code>frequency([-17322, -374, -17322, -374, -17322, -374])</code>	<code>([-17322, -374], [-17322, -374])</code>
Test Case 6	<code>onehop([(1, 3), (1, 2), (2, 3), (2, 1), (3, 2), (3, 1)])</code>	<code>[(1, 2), (1, 3), (2, 1), (2, 3), (3, 1), (3, 2)]</code>
Test Case 7	<code>onehop([(1, 2), (1, 3), (1, 4), (1, 5), (1, 6), (1, 7), (1, 8), (1, 9), (2, 1), (2, 3), (2, 4), (2, 5), (2, 6), (2, 7), (2, 8), (2, 9), (3, 1), (3, 2), (3, 4), (3, 5), (3, 6), (3, 7), (3, 8), (3, 9), (4, 1), (4, 2), (4, 3), (4, 5), (4, 6), (4, 7), (4, 8), (4, 9), (5, 1), (5, 2), (5, 3), (5, 4), (5, 6), (5, 7), (5, 8), (5, 9), (6, 1), (6, 2), (6, 3), (6, 4), (6, 5), (6, 7), (6, 8), (6, 9), (7, 1), (7, 2), (7, 3), (7, 4), (7, 5), (7, 6), (7, 8), (7, 9), (8, 1), (8, 2), (8, 3), (8, 4), (8, 5), (8, 6), (8, 7), (8, 9), (9, 1), (9, 2), (9, 3), (9, 4), (9, 5), (9, 6), (9, 7), (9, 8)])</code>	<code>[(1, 2), (1, 3), (1, 4), (1, 5), (1, 6), (1, 7), (1, 8), (1, 9), (2, 1), (2, 3), (2, 4), (2, 5), (2, 6), (2, 7), (2, 8), (2, 9), (3, 1), (3, 2), (3, 4), (3, 5), (3, 6), (3, 7), (3, 8), (3, 9), (4, 1), (4, 2), (4, 3), (4, 5), (4, 6), (4, 7), (4, 8), (4, 9), (5, 1), (5, 2), (5, 3), (5, 4), (5, 6), (5, 7), (5, 8), (5, 9), (6, 1), (6, 2), (6, 3), (6, 4), (6, 5), (6, 7), (6, 8), (6, 9), (7, 1), (7, 2), (7, 3), (7, 4), (7, 5), (7, 6), (7, 8), (7, 9), (8, 1), (8, 2), (8, 3), (8, 4), (8, 5), (8, 6), (8, 7), (8, 9), (9, 1), (9, 2), (9, 3), (9, 4), (9, 5), (9, 6), (9, 7), (9, 8)]</code>
Test Case 8	<code>onehop([(1, 2), (2, 3), (3, 4), (4, 5), (5, 1)])</code>	<code>[(1, 3), (2, 4), (3, 5), (4, 1), (5, 2)]</code>
Test Case 9	<code>onehop([(1, 2), (2, 3), (3, 4), (4, 5), (5, 1), (5, 6), (6, 7), (7, 8), (8, 9), (9, 5)])</code>	<code>[(1, 3), (2, 4), (3, 5), (4, 1), (4, 6), (5, 2), (5, 7), (6, 8), (7, 9), (8, 5), (9, 1), (9, 6)]</code>
Test Case 10	<code>onehop([(1, 2), (2, 1), (3, 4), (4, 3)])</code>	<code>[]</code>

Test Case 11	<code>frequency([1,2,3,4,5,5,4,3,2,3,4,5,5,4,5])</code>	<code>([1], [5])</code>
Test Case 12	<code>frequency([4,4,4,1,1,2,2,2,3,3])</code>	<code>([1, 3], [2, 4])</code>
Test Case 13	<code>frequency([1,1,1,1,1])</code>	<code>([1], [1])</code>
Test Case 14	<code>onehop([(1,2),(2,1)])</code>	<code>[]</code>
Test Case 15	<code>onehop([(1,2)])</code>	<code>[]</code>
Test Case 16	<code>onehop([(1,3),(1,2),(2,3),(2,1),(3,2),(3,1)])</code>	<code>[(1, 2), (1, 3), (2, 1), (2, 3), (3, 1), (3, 2)]</code>

The due date for submitting this assignment has passed.  
As per our records you have not submitted this assignment.