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Tutorial

Let's learn about list comprehensions! You are given three integers  $x, y$  and  $z$  representing the dimensions of a cuboid along with an integer  $n$ .

Print a list of all possible coordinates given by  $(i, j, k)$  on a 3D grid where the sum of  $i + j + k$  is not equal to  $n$ . Here,

$0 \leq i \leq x; 0 \leq j \leq y; 0 \leq k \leq z$ . Please use list comprehensions rather than multiple loops, as a learning exercise.

**Example**

$x = 1$

$y = 1$

$z = 2$

$n = 3$

All permutations of  $[i, j, k]$  are:

`[[0, 0, 0], [0, 0, 1], [0, 0, 2], [0, 1, 0], [0, 1, 1], [0, 1, 2], [1, 0, 0], [1, 0, 1], [1, 0, 2], [1, 1, 0], [1, 1, 1], [1, 1, 2]]`

Print an array of the elements that do not sum to  $n = 3$ .

`[[0, 0, 0], [0, 0, 1], [0, 0, 2], [0, 1, 0], [0, 1, 1], [1, 0, 0], [1, 0, 1], [1, 1, 0], [1, 1, 1], [1, 1, 2]]`

**Input Format**

Four integers  $x, y, z$  and  $n$ . each on a separate line.

**Constraints**

Print the list in lexicographic increasing order.

**Sample Input 0**

```
1
1
1
2
```

**Sample Output 0**

```
[[0, 0, 0], [0, 0, 1], [0, 1, 0], [1, 0, 0], [1, 1, 1]]
```

**Explanation 0**

Each variable  $x, y$  and  $z$  will have values of **0** or **1**. All permutations of lists in the form

$[i, j, k] = [[0, 0, 0], [0, 0, 1], [0, 1, 0], [0, 1, 1], [1, 0, 0], [1, 0, 1], [1, 1, 0], [1, 1, 1]]$

Remove all arrays that sum to  $n = 2$  to leave only the valid permutations.

**Sample Input 1**

```
2
2
2
2
```

**Sample Output 1**

```
[[0, 0, 0], [0, 0, 1], [0, 1, 0], [0, 1, 2], [0, 2, 1], [0, 2, 2], [1, 0, 0], [1, 0, 1], [1, 0, 2], [1, 1, 0], [1, 1, 1], [1, 1, 2], [1, 2, 0], [1, 2, 1], [1, 2, 2], [2, 0, 0], [2, 0, 1], [2, 0, 2], [2, 1, 0], [2, 1, 1], [2, 1, 2], [2, 2, 0], [2, 2, 1], [2, 2, 2]]
```

Change Theme

Language

Pypy 3

```
1 if __name__ == '__main__':
2     x = int(input())
3     y = int(input())
4     z = int(input())
5     n = int(input())
6     print(list([i,j,k] for i in
7         range(x+1) for j in range(y+1) for k in range(z+1) if i+j+k != n))
8
```

Line: 8 Col: 1

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