

PCD Engineer Dev Tests

Answer three (3) of the following problems using the Python. Please provide source code to each project separated by folders, named for the respective question that is being answered (q1, q2, q3, etc.), within 48 hours of receiving this test.

Please note, we consider elegant design and clean coding style equally as important as a correct solution. Simple and clear configuration and deployment of your solution will also go into consideration.

Each program should accept a file, the full path of which should be a parameter passed into your program, as input. The output should be sent to standard out. Each problem below includes sample input and sample output. Please conform your input and output to the samples provided. Also note that the “***” characters are for delineation only and should not be included as input or as output.

Example:

```
root@localhost> python FindSource /home/root/devtest/q1/example.txt
root@localhost> 3.0 4.0
```

1: Finding the source

In a field, we have hidden an object with a radio transmitter. However, a battery failure has made it so that the transmitter emits pulses only once every 6 hours. You have already taken measurements at two points and, from the strength of the signal, determined the distance that the object must be from those points.

Your job now is to write a program to find all of the locations, if any, where the object might be. You only have the two datapoints you have already taken, and you can't wait to take any more.

Your program will be given an input file that contains two data points that look like the following, each on a separate line.

```
<x position> <y position> <distance from object>
```

For example, consider the following input:

```
***  
6.0 8.0 5.0  
0.0 0.0 5.0  
***
```

Then the output of your program should be:

```
***  
3.0 4.0  
***
```

which indicates that the object must reside at coordinates $x = 3, y = 4$.

2 Justifying text

Suppose you are programming for a really old-school internet newspaper, one that is so old-school that they only have monospace fonts. However, the editor really wants to see the monospace text justified to fit into the column space he has at a particular time. Your job is to write a program that will take as input the width of the column in characters and the entire text to be formatted, and return the same text except justified to fit into the column.

For example, consider the following input:

```
***  
20  
The quick brown fox jumps over the lazy dog.  
***
```

Then the output of your program should be:

```
***  
The quick brown fox  
jumps over the lazy  
dog.  
***
```

As you can tell from this example, the last line does not have to be justified.

3 String Manipulation

Write a function to compact a string in place:

1. strip whitespace from the string.
2. remove duplicate characters if they are next to each other

For example, consider the following input:

```
***
```

```
abb cddpdef gh  
***
```

Then the output of your program should be:

```
***  
abcdpdefgh  
***
```

4 Spiral printing

Write a function to print a 2-D array ($n \times m$) in spiral order (clockwise).

For example, consider the following input:

```
***  
1 2 3  
4 5 6  
7 8 9  
***
```

Then the output of your program should be:

```
***  
1 2 3 6 9 8 7 4 5  
***
```