Polar Coordinates

HackerRank

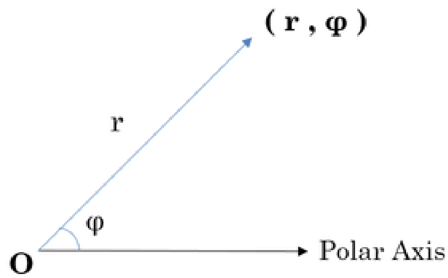
Polar coordinates are an alternative way of representing Cartesian coordinates or Complex Numbers.

A complex number z
Capture.PNG

$$z = x + yj$$

is completely determined by its real part x and imaginary part y.
Here, j is the imaginary unit.

A polar coordinate (r, φ)



is completely determined by modulus r and phase angle φ.

If we convert complex number z to its polar coordinate, we find:
r: Distance from z to origin, i.e., $\sqrt{x^2 + y^2}$
φ: Counter clockwise angle measured from the positive x-axis to the line segment that joins z to the origin.

Python's cmath module provides access to the mathematical functions for complex numbers.

$cmath.phase$
This tool returns the phase of complex number z (also known as the argument of z).

```
>>> phase(complex(-1.0, 0.0))
3.1415926535897931
```

abs
This tool returns the modulus (absolute value) of complex number z.

```
>>> abs(complex(-1.0, 0.0))
1.0
```

Task
You are given a complex z. Your task is to convert it to polar coordinates.

Input Format

A single line containing the complex number z. Note: complex() function can be used in python to convert the input as a complex number.

Constraints

Given number is a valid complex number

Output Format

Output two lines:
The first line should contain the value of r.
The second line should contain the value of φ.

Sample Input

```
1+2j
```

Sample Output

```
2.23606797749979
1.1071487177940904
```

Note: The output should be correct up to 3 decimal places.