

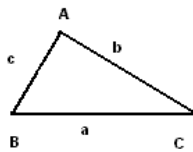
# Computing for Scientists - Lab 1

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## 1 Introduction

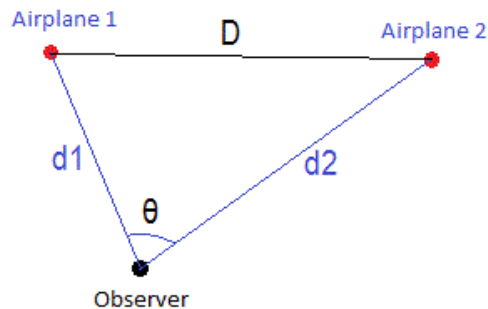
Imagine you work for an ATC (air traffic control) tower, located at point O (observer, see figure below). The radar system detects the distance from O to each of the two aircrafts -  $d1$  and  $d2$ , as well as the angle  $\theta$ . You are asked to determine distance  $D$ , given  $d1$ ,  $d2$  and  $\theta$ . The problem is an application of the Cosine Law, which in its general case can be stated as:



$$a^2 = b^2 + c^2 - 2 * b * c * \cos(\theta) \quad (1)$$

In our particular case,  $D$  can be computed as follows:

$$D^2 = d1^2 + d2^2 - 2 * d1 * d2 * \cos(\theta) \quad (2)$$



**Sample Runs** Your program needs to **follow exactly the output format, as in the following sample runs. This includes whitespaces, newlines and number of significant digits (4).**

Sample run 1 (sol.m)

```
>> sol
```

```
****ATC computation****
```

```
Enter d1 (distance 1 from the observer): 40
```

```
Enter d2 (distance 2 from the observer): 72
```

```
Enter angle theta between the two airplanes: 34
```

```
The distance between the two airplanes is: 44.8190
```

Sample run 2:

```
>> sol
```

```
****ATC computation****
```

```
Enter d1 (distance 1 from the observer): 10.23
```

```
Enter d2 (distance 2 from the observer): 10.78
```

```
Enter angle theta between the two airplanes: 3.33333
```

```
The distance between the two airplanes is: 0.8220
```

Sample run 3:

```
>> sol
```

```
****ATC computation****
```

```
Enter d1 (distance 1 from the observer): 72
```

```
Enter d2 (distance 2 from the observer): 50
```

```
Enter angle theta between the two airplanes: 45
```

```
The distance between the two airplanes is: 50.9199
```

- This program uses input; you will have to prompt the user for d1, d2 and theta.
- Your program should handle either kind of number, integer or floating point.
- Use assignment statements to perform the calculations, not output statements.
- Make sure you format the lines of the output as described. The line breaks and the punctuation should be as shown. The output messages should be exactly as given.

## 2 Grading Rubric

### Program Correctness (90 points)

Introductory message  
Calculations are correct  
Calculations are done in assignment statements  
Displays results correctly, both values

### Style and documentation (10 points)

Prolog (name & purpose)  
Comments  
Whitespaces

## Due dates

1. Due Sunday, January 28th, before midnight.