CS205 C/ C++ Programming - Assignment 1

You are asked to write a simple program that, as you will see, may not be as simple to write in C as it looks if you want to write robust programs. It will allow you to learn about basic input/output.

This program must prompt the user for the name of a first city, then its latitude and longitude, then for the name of a second city with its latitude and longitude, then compute the flying distance between the two and display. For example,

```
The first city: Shenzhen
The latitude and longitude of first city: 22.55 114.1
The second city: Beijing
The latitude and longitude of second city: 39.9139 116.3917
The distance between Shenzhen and Beijing is <result> km
```

"*The first city:*" , "*The latitude and longitude of second city*",*The second city:*" and "*The latitude and longitude of second city:*" are prompt information.
Your program should print prompt information to tell user enter the information of city.
User will enter city name first (in the first line). Then user enters two floating numbers : latitude and longitude of city(in the second line)**.If user's input format is not correct. Your program should not crash and tell user the format is incorrect and exit.** <result> is the distance calculated by your program.

Here is the formula for computing the distance (adapted from mathforum.org, provided by Doctor Rob):
Assume the Earth is a perfect sphere. Let all angles be measured in signed degrees (negative latitude means South; negative longitude means West).

phi = 90 - latitude

The North Pole has phi = 0, the South Pole has phi = 180, and 0 <= phi <= 180.

theta = longitude

Greenwich, England, has theta = 0, and -180 <= theta <= 180.
Let the angles for the two points be (phi1, theta1) and (phi2, theta2). Then compute

c = sin(phi1) * sin(phi2) * cos(theta1-theta2) +cos(phi1) * cos(phi2)

Note: phi and theta should be in radians.

Then the shortest great circle distance between the two points is

d = R*arccos(c)

where R is the radius of the earth in kilometers, and the arccosine is taken between 0 and 180 degrees, inclusive. Earth radius: 6,371 km

Some cities for testing:

city	latitude	longitude
Shenzhen	22.55	114.1
Beijing	39.9139	116.3917
New York, USA	40.7127	-74.0059
San Francisco, USA	37.7833	-122.4167
London, UK	51.5072	-0.1275
Paris, France	48.8567	2.3508
Kolkata, India	22.567	88.367
Moscow, Russia	55.7500	37.6167
Rio de Janeiro, Brazil	-22.9083	-43.1964
Sydney, Australia	-33.865	151.209444

For checking out if your results are roughly correct:
http://www.webflyer.com/travel/mileage_calculator/

Note: you must input the city name in English, and the city name should not appear unreasonable symbols, such as @, ￥, %, etc