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: <>

The second city: <>

The distance between <first city> and <second city> is <result> km

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)

Then the shortest great circle distance between the two points is

d = R*Arccos(c)*Pi/180

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
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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.worldatlas.com/travelaids/flight_distance.htm