

## Math 242

## Extra Credit Project

Here are some tips to help you get started. To figure out distances to the different colleges in Virginia, it would help to find their latitude and longitude and convert those into  $x,y$ -coordinates. Here are some facts that might help:

- You are free to choose which point is the origin.
- One degree of latitude is approximately 69 miles.
- The gap between two lines of longitude is wider at the equator and smaller near the poles. Here in Virginia, each degree of longitude is about 55 miles.
- Use Google to find latitudes and longitudes.

I recommend using a method known as Gradient Descent (see [http://en.wikipedia.org/wiki/Gradient\\_descent](http://en.wikipedia.org/wiki/Gradient_descent)) to find the  $x,y$ -coordinates for the hub that minimizes the total distance traveled.

You may work with a partner and turn in a project together, if you wish. Make sure that both of your names are on your report. All projects must be typed on a computer. Please document all of your work. You may use any software you wish (Excel, Wolfram-Alpha, Sage, Calculator, etc.) A high quality report will include a detailed solution written in language that a non-expert can understand. It will also include pictures that help explain the solution.

This project will be worth either 1 or 2 quiz grades. A high quality report will be worth 2, while an average report will be worth 1.