

Great Circle Distance Calculations

1) Create a spreadsheet called GRCRCLzz, where zz are your initials, use the exact method (GIS Textbook Chapter 2 graphic, shown in lecture) and calculate the great circle distance from

St. Paul (44.9537N, 93.0900W)

to the following locations:

Chicago, Illinois: 41.8781N, 87.6298W

New York, New York: 40.7128N, 74.0059W

Reykjavik, Iceland: 64.1265N, 21.8174W

Paris, France: 48.8566N, 2.3522 E

Buenos Aires, Argentina: 34.6037S, 58.3816W

Please turn in this spreadsheet via Canvas.

2) Use the “spherical triangles” method to calculate the initial azimuth from

a) St. Paul to Reykjavik, and

b) St. Paul to Buenos Aires.

Do the azimuth values make sense, thinking of the definition of azimuth, as the angle from North, clockwise?

Please do the calculations on a sheet of paper, showing your work, and either scan/take photo and submit via Canvas, or bring to class.

3) Create a spreadsheet and convert the coordinates for all six locations from spherical to 3-D Cartesian coordinates, using the formula shown near the end of this week’s lecture.

Calculate the “chord” or tunnel distance from St. Paul to the five other locations, using the formula:

$$D = \text{square root}[(X1-X2)^2 + (Y1-Y2)^2 + (Z1-Z2)^2]$$

How big is the chord vs. the great circle distance you calculated for each city in part 1, and does this difference change linearly with the chord distance?

Please turn in this spreadsheet using Canvas.