

**SURVEYING ENGINEERING
FERRIS STATE UNIVERSITY**

**SURE 452 - Geodesy 1
Homework #2**

Winter 2003/04

For the appropriate problems, use the parameters for the GRS80.

1. Write a program, in Visual Basic, to compute the azimuth (forward and reverse) and distance between stations **Hoodport** and **Detroit 1**. Use the Bowring method. The data sheets for the two points can be found at the National Geodetic Survey (NGS) web page (<http://www.ngs.noaa.gov>) under Datasheets. Use the NAD 83(1994) data values. Compare your results with those of the NGS program INVERSE that is also available, either in a downloadable form or interactive, at the NGS web site under PC Software. Include the results of the comparison and a discussion.
2. Write a program, in Visual Basic, to compute the latitude, longitude and reverse azimuth to a point whose forward azimuth from **Hoodport** is $182^{\circ} 14' 33.3075''$ and ellipsoidal distance of 93,007.7437 meters. Use the Puissant formulas. Verify your results with the program FORWARD that is available at the NGS web site. While at this site, find the nearest horizontal control point to this end point in the NGS database.
3. Given the Cartesian coordinates of the following point, write a program, either in Visual Basic or MathCad, to compute the latitude, longitude and height using the method by Lin and Wang that was published in **Bulletin Géodésique**. You can compare your results with the program XYZWin that is available at the NGS web site. The coordinates of the point are:

$$X = 354,327.587 \text{ m}$$

$$Y = -4,606,955.685 \text{ m}$$

$$Z = 4,382,483.757 \text{ m}$$