

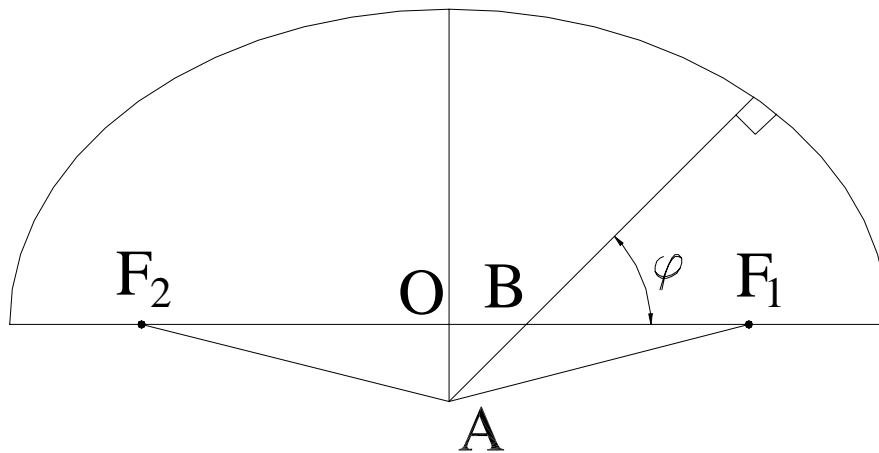
**SURVEYING ENGINEERING
FERRIS STATE UNIVERSITY**

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

Winter 2003/04

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

1. The two radii of curvature are equal at one point ($M = N$). Where is this true? Provide a proof.
2. Given the equatorial radius and flattening only, compute the distances OB , AB and AF_2 as shown in the figure below. Note that F_1 and F_2 are the foci of the ellipse.



3. What are the space rectangular coordinates of the point defined by $\phi = N 43^\circ 40' 38.6''$, $\lambda = W 85^\circ 36' 07.0''$, $H = 390.1$ m.
4. Compute the distance between point A ($\phi = 30^\circ N$, $\lambda = 90^\circ W$) and B ($\phi = 43^\circ 29' N$, $\lambda = 90^\circ W$) considering the surface as a plane (inverse between the space rectangular coordinates of both points), sphere (use the mean radius of the earth) and ellipsoid.
5. In lecture, the meridian arc length on the ellipsoid was given in terms of a number of coefficients (A, B, C, D, E and F). Compute the effect that each term has on a meridional distance. Use the points defined in question #4.
6. Compute the length of a parallel at $37^\circ 25' 14''$ north latitude between two points on longitudes $W 85^\circ 36' 07''$ and $W 137^\circ 27' 28''$. Like question 4, compute the distances treating the system as plane coordinates, on a sphere, and on the ellipsoid.