1. A point P has a spherical coordinate of r = 6378788.489 m, spherical latitude of 9.039544°, and longitude of 38.761301°. Calculate the rectangular coordinate.
2. A point A on sphere has the following rectangular coordinate X = 4961166.873 m, Y = 3898630.315 m, and Z = 936187.758 m. Calculate the spherical coordinates.
3. Convert the following rectangular coordinate in Adindan Datum to Geodetic coordinate: X = 4962536.72 m, 3898588.309 m, and Z = 930033.327 m.

A) Using Closed Formula

B) Using Iteration (Use MATLAB)

1. The Grand Ethiopian Renaissance Dam is located at λ = 35.092716°, geodetic latitude of φ = 11.213525°, h = 996 m in WGS 84 datum. Calculate the rectangular coordinate of the point.
2. A point P in front of 5 Kilo Campus Library has geodetic coordinate of λ = 38.763150°, φ = 9.040810°, h = 2477 m. Compute a small change in geodetic and rectangular coordinate for this point. Assume the change in rectangular coordinate is 1 mm and for geodetic coordinate 1 sec (for angles, lat and long) and 1 mm (for ellipsoidal height). (Use MATLAB)
3. Use a point on Question No 5 and determine the reduced and geocentric latitude.
4. For the following rectangular coordinate, compute the topocentric coordinate of Point A (N, E, U) with geodetic coordinate φ = 57.395483300, λ = 11.925395149, h = 43.372. (Use MATLAB)

Xp=3370641.970

Yp=711866.128

Zp=5349796.160

X=3098889.388

Y=1011032.696

Z=5463980.133

1. A geodetic triangle formed by point A, B and C is as shown in figure below. Compute the spherical excess.

|  |  |  |  |
| --- | --- | --- | --- |
| Point  | Lat | Long | Remark |
| A |  9.821519° | 49.779333° | WGS 84 |
| B |  1.776369° | 35.642067° | WGS 84 |
| C | 15.345004° | 34.341945° | WGS 84 |

1. A point A along a geodetic line has a coordinate of φ = 39°30’ N, λ = 15°10’ E, and αA = 35°36’. A Point B on the same geodetic line has φ = 45°35’ N. Compute the geodetic azimuth at point B. Compute also the minimum geodetic azimuth.
2. Point A has spherical coordinate of φ = 9.821519°, λ = 49.779333° with geodetic azimuth 80° Compute the spherical coordinate of point B if the distance between A and B is 1867 km.
3. Point A and C has spherical coordinate of φ = 9.821519°, λ = 49.779333° and φ = 15.345004°λ = 34.341945° respectively. Compute geodetic azimuth from point A to C, from C to A and distance between A and C.