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Geodesy Course 2008. Exercise 2.

1. Use the same potential, W, as in exercise 1.7.

Write down the 3 components of the gravity vector in spherical harmonics. (Note that the contribution from the centrifugal part was calculated in exercise 1.3 and the first term GM/r in exercise 1.4.

Calculate the magnitude of the gravity vector in the 3 points of exercise 1.7.

Normal gravity at equator and at the North Pole are respectively
$\gamma_a = 9.7803267715$ m/s^2 and $\gamma_b = 9.8321863685$ m/s^2 . If W was the true potential, what are then the gravity disturbances at the North Pole and at Equator. What is the gravity anomaly at the two points ?

2.1 Normal gravity in GRS80 must be calculated in two steps:
(a) Calculate normal gravity a the ellipsoid (h=0) using
$\gamma_{0=}\ \gamma_a(1+0.005279\ \sin^2(\varphi) + 0.00002327\sin^4(\varphi))$ and for small heights
$\gamma - \gamma_0 = -(0.30877)h$ with h in meters.

A point has geodetic latitude 5 degrees and ellipsoidal altitude h=200 m. What is the value of normal gravity.