UNIVERSITY OF OSLO
Faculty of Mathematics and Natural Sciences

Compulsory Project AST2110 — The Universe

Handed out: Tuesday 17th April 2007

To be delivered: Tuesday 24th April before 16.00

This exercise set contains 2 pages.

Allowed sources of help: All, you can cooperate with others, but you must write down the results independently, identical hand-ins will be not be accepted. For graphic plots, computation and programming, Matlab or a similar package should be used. Printout of the code is to be delivered together with the project report. The project report must be tidy with sufficient description of the methods used. Glue/paste in tables and figures, so that the report looks tidy.

On the 3rd and the 4th of March 2007, there was an interesting phenomenon in the sky.

a) The Sun's position in the sky (seen geocentrically) was $\alpha = 22^h53^m41.1^s$ and $\delta = -07°03'09''$ on the 3rd of March 2007, at 00.00UT and $\alpha = 23^h01^m08.6^s$ and $\delta = -6°17'05''$ on the 5th of March at 00^h.00UT. Assume that the position of the Sun is changing linearily with time during these days, and find the right ascension and the declination of the Sun for every hour (UT) from 3d March 2007 at 00^h.00UT to 5th March at 00^h.00UT. Prefably write a Matlab programme doing this. Be careful about conversions when the integer number of hours or degrees is zero, especially think about the possibility that the declination then can be negative.

b) The geocentric position of the Moon is $\alpha = 10^h15^m05.2^s$ and $\delta = 12°18'23''$ on the 3d March 2007 at 00.00UT and $\alpha = 11^h41^m28.5^s$ and $\delta = 1°04'53''$ on the 5th March at 00^h.00UT. Repeat exercise a) for the Moon, and find also the angular distance from the point on the sky directly opposite to the Sun to the Moon for each hour. Plot this distance as a function of UT. When is the distance at its minimum? According to the Almanac of Norway, there was a lunar eclipse on the night betweeen the 3rd and the 4th March that in Oslo was total between 23.44 and 00.58. Comment on this in view of your calculations.

c) What was the altitude of the Moon in Oslo at midnight Norwegian standard time in the night between the 3rd and the 4th of March 2007?