EMSC3032 - Assignment 3

Positions on the Earth can be estimated in real time using conventional hand-held GPS receivers, which utilize knowledge of the satellites' locations, clock offsets and pseudoranges (observed distance between receiver and satellite uncorrected for clock errors and atmospheric effects).

The file pseudo.obs contains pseudorange observations to several satellites at a single epoch.

i) (5 marks) Using the information in this observation file, calculate the cartesian coordinates of the GPS receiver that recorded the observations, and the latitude/longitude of the location (assume a spherical Earth when converting to latitude/longitude).

ii) (1 marks) What are the uncertainties of each of the estimated Cartesian coordinates and the receiver clock offset?

iii) (3 marks) Re-calculate the location taking into account the uncertainties of each pseudorange observation. By how much do the parameter estimates (and the uncertainties) change?

iv) (1 marks) Calculate the correlations between each parameter

Notes:

1. *The observations are from a real GPS receiver that was located on rock on the surface of the Earth somewhere.*

2. *The file pseudo.obs contains the cartesian coordinates of the satellites (in km), the satellite clock offset from GPS time (in microseconds), the pseudorange observations (in metres) and the uncertainty of each pseudorange observation (in m).*