AH2923 VT2023

Assignment 2
Compute satellite position from broadcast ephemerids

Your task is to compute coordinates of GPS satellites and satellite clock corrections using broadcast ephemeris. The results from this computation will be used in the following labs, where you will use measured pseudoranges to compute receiver's coordinates.

Detailed instructions are given in the document "**GPS single point positioning algorithm**", steps 1 - 7 in Table 1 on page 7.
Use time epoch 01:00 in the observation file **0lov033b.04o,** where you can find the satellites for which you are supposed to compute the coordinates. The broadcast ephemeris are in the file **0lov033b.04n**.

The files are in the RINEX format, which is an international format used for exchange of GNSS data. A description of the data format is available in the file **rinex.txt,** which is also available in Canvas.

Compute the positions for the satellites and the satellite clock correction for the system transmit time (t^s). Use P1 pseudoranges from the RINEX file to compute t^s.

Verify your results by comparing them with the results provided in the file **SatPosResult.pdf** which is also available in Canvas. In this file, you can see the result for satellite number 24. The file also contains results for some of the intermediate steps in the calculations, which can be useful for debugging if your result is not correct.

Finally, compute the satellites' coordinates for time 01:00 and compare them with the coordinates provided in the sp3 file with precise satellite positions (**igs12561.sp3**). In sp3 files the satellite positions are provided every 15 minutes. Note that the unit used for coordinates in the sp3 file is km.

The report must contain:

- A list of satellite coordinates and satellite clock errors for the system transmit time.
- Discussion based on the comparison with data from the sp3 file.
- Matlab code for determination of satellite positions from broadcast ephemerids must be submitted separately. Make sure to submit all files necessary for the teacher to run the scripts, also the input file, if you modify from the original file.