LAB 6 – Carrier-Phase Differential Galileo

Goal: Determination of point coordinates with cm-level accuracy via relative positioning.

Part A: Formation of double-differences of code & phase observations on two freq.
Part B: Geometry-free ambiguity resolution (+ ionosphere variation)
Part C: Baseline-coordinates determination

PART A – Formation of Double-differences of Observables on Two Frequencies

Task: Given observations from two multi-frequency Galileo receivers to 8 satellites, determine the double differenced code and phase observations on E1 and E5a frequencies, respectively.

Input (Moodle)**:**

- Observation files for the master and rover receiver: **`datam.mat datar.mat`**

Format:

```
% Each row in a data-file has 6 columns with the contents
%       #1   #2     #3    #4       #5       #6
%   TOW(s)  PRN  C1X(m) C5X(m) L1X(cyc.) L5X(cyc.)
%       :     :      :     :        :        :
```

Methodology:

1. Allocate memory for double-differenced observations for all satellites and epochs.
2. Epoch par epoch form double-differences of all 4 observations with respect to the **assigned based satellite**. (Use a function for that purpose!)
3. Form covariance matrix for double differenced observations and observation weights per one epoch.

Hints:

- Use `load('datam.mat')` and `load('datar.mat')` to retrieve the data.
- The data between receivers are already **aligned** in epochs and satellites
- Pay attention to the **units** on phase observations (i.e. convert cycles to meters)
- *Self-control (useful for debugging purposes) – with **base PRN 8***:
  Double-differenced code and phase on first frequency at 1st epoch:
  `DD( 8- 2): C1(m)= -87.04 L1(m)= -89.668`
- The suggested weighting of code and phase observations (i.e. `obsw`) per epoch is

```
std  = [0.5 0.5 0.01 0.01]; %[m] for [C1 C5 L1 L5]
obsw = std.^(-2);
```