ASEN 5090 Assignment 1

Complete the function `generate_mls` that generates maximum-length binary sequences.

- The function should take in a shift register length N, along with index arrays representing the feedback and output taps.
- The function should return a binary-valued (0-1) sequence of length $2^N - 1$

Use the function `generate_mls` from part 1 to **complete the function `generate_l1ca_code`**, which generates and returns the binary the GPS L1 C/A code sequence given the GPS PRN number.

- Arrays containing the appropriate feedback taps for the G2 MLS have been generously provided in the project skeletons.
- The function should take in a PRN (integer b/w [1, ..., 32]) and return the Gold code binary sequence for that PRN.

Complete the function `generate_code_samples` that generates a time-series of code samples given the sampling rate, sampling duration, code sequence, code chipping rate, and initial code phase.

Choose 2 PRNs, **sample their code sequences**, and **convert the samples to +-1** (i.e. a modulated signal of constant magnitude). **Plot the auto-correlation** for each and the **cross-correlation** of the two signals.

- This process is mostly outlined in the rest of the code skeletons. Only a few additions are needed.

You should use one of the project skeletons that were uploaded to D2L. Submit your completed assignment to the appropriate D2L dropbox by midnight on Tuesday, 09/20.

If your submission contains multiple files (only MATLAB users need to do this for the first project), make sure you zip them into one file.

Name your submission using the format *firstName_lastName_proj1* (along with the appropriate file extension).

Notes / Hints

It's worth playing around with the parameters in the skeletons. Try changing the PRNs, sampling frequency and duration, and initial code phases. Try plotting the auto-correlation between a given PRN code sequence sampled at different intial code phases.

Also, to give an idea of how much complexity goes into each function, the body of my functions use up:

- `generate_mls`: 8 lines of code
- `generate_l1ca_code`: 4 lines of code
- `generate_code_samples`: 3 lines of code