Tasks:

- Study the mfile `cnum2sys.m`, and verify that it works as claimed in the course slides
- For each file listed below, publish the file to get a nice formatted version.
- Work through the code sections, executing the commands yourself, and try understand the results. You may work with others (2 to a group). Try to tie the commands/results to specific slides from the lectures.
- For those problems marked (study and understand), write a short summary (3-4 sentences) about the lessons learned from the file, and the connections to the lecture slides

1 Uncertain Analysis: theory

1. `verifyMUSSV`, simple use of `mussv` and verifying the upper and lower bounds using the definition, and the returned arguments (study and understand)
2. `DestabilizingPerturbation`, `DestabilizingPerturbationSolution`, exercise (and solution) to understanding the *necessary* direction of the MIMO small-gain theorem (study and understand)
3. `UncertainModeling`, illustrations of the uncertain atoms (eg., `ureal`, `ultidyn`) and their use in uncertain matrices and sampling (study and understand)
4. `lftExplore`, simple investigations into the LFT (linear fractional transformation) as a composable data structure for representing uncertain matrices and systems (study and understand)

2 Uncertainty Modeling and Analysis

1. `WorstCaseAnalysisIntroduction`, script associated with powerpoint file presented in class, introducing the robustness analysis problems and tools (study and understand)
2. `stateSpaceParameterUncertainty`, formulating a system with extensive parametric uncertainty in the state-space matrices (study and understand)
3. `dcmotor_demo1`, using the uncertain objects to model simple uncertain plants and explore the behavior of these under feedback control
4. `rsrpmu`, SISO control design using loopshaping, with subsequent robustness analysis using μ and high-level robustness analysis commands (study and understand)
5. `FlightControlExWithSSV`, uncertain modeling, and subsequent analysis of a system with 12 real-parameter and two unmodeled dynamics uncertainties (study and understand)
6. `mimoMotivate`, the uncertain closed-loop has excellent robust stability **and** nominal performance properties, but very poor robust performance (study and understand)
7. `mimoMotivateResolveMU`, the previous example is analyzed and understood from the μ-perspective