

---

**1. (3.33 points for each system, or 10 points in total)**

The goal of this exercise is to identify dynamic systems using input-output data. Start MATLAB and load the data from the file 'data.mat'. This file contains input-output datasets collected from three different dynamic systems:  $(u_1, y_1)$ ,  $(u_2, y_2)$ , and  $(u_3, y_3)$ . The sampling frequency for all datasets is 1 Hz. Using MATLAB's System Identification Toolbox, identify polynomial models for each of the given dynamic systems. Make sure to explicitly select a model as your final answer for each input-output dataset.

Create a report (e.g., a Word document). In the report, answer the following questions for each system:

- What is your chosen model structure?
- Present the resulted plots and information related to the validation procedure for your selected model structure. This could include residual analysis plots, poles and zeros plots, variance analysis information, etc.
- Are there alternative models for the data? If so, list them.

Save the final identification session for each dynamic system with the corresponding filenames: "sys01.sid" for  $(u_1, y_1)$ , "sys02.sid" for  $(u_2, y_2)$ , and "sys03.sid" for  $(u_3, y_3)$ .

**Include a snapshot of your final .sid files in your report.**

Your assignment will be graded based on the chosen model structures and their orders, as well as the identification path you took.

**What to return?**

You are expected to submit your assignment to the related link for Assignment 5 in MyCourses. Your submission should include the report file, "Assignment\_5\_\*.pdf", and the following System Identification Toolbox session files: "sys01.sid", "sys02.sid", and "sys03.sid".

The hard deadline for submission of this assignment is 19.11.2023 at 23:59.