Tutorial 1
World of MATLAB

The objective of this tutorial is to get you familiar with some fundamental commands you can use for modeling, designing and tuning control systems.

Perform all the programming steps in a single file named **<roll_number>_T1.m** and submit that. Submit a PDF for Exercise 2.

Exercise 1: The denominator of a system's transfer function is:

$$P_1 = s^6 + 7s^5 + 2s^4 + 9s^3 + 10s^2 + 12s + 15$$

1. Plot the roots of this equation using the *plot* command
2. Identify if the system is stable or unstable, automatically, using a script
3. If $G_2 = 1 / P_1$ plot the step response of this system.
4. Use the *syms, tf* and *sym2poly* commands (and any other needed commands) to generate the transfer function $\mathbf{G_1}$ of the system such that the unit step response settles at 1 (hint: add zeros if needed). Generate the plots to support your solution.
5. Find the inverse laplace transform of $\mathbf{G_1}$ and $\mathbf{G_2}$.

Exercise 2: Generate the Routh table for $\mathbf{G_2}$ and identify the stability of the system using the Routh-Hurwitz criterion.