University of Chemistry and Technology
in Prague

Department of Mathematics,
Informatics and Cybernetics

Control Theory
Assignment #1

Name: Joana Bonack
Date: 10/10/2023

---

1. Using Laplace transform, solve $y''(t) + 16y'(t) + 64y = 9 + 13e^{-t}$ for $y(t)$, given the initial conditions $y(0) = 7$ and $y'(0) = 8$. Confirm your solution using MATLAB.

2. Find the steady-state value for the system that is described by the differential equation above.

3. You are given a transfer function:

$$H(s) = \frac{1}{s^2 + 15s + C}$$

   Find the interval of C for which the system is stable using the knowledge of the poles placement in the complex plane, using the Hurwitz criterion, and using the Routh-Shur criterion.

   Note: Since the poles are placed in the complex domain, remember to expand all your calculations to the complex domain as well!

4. Using MATLAB, for the $H(s)$ given above and $C = 2500$, find the *rise time*, *settling time*, *peak time*, *peak value*, and *overshoot*. Also, plot the *impulse response* and *step response*.