Lecture 17: Digital Control MATLAB Session

ELEN 472: Introduction to Digital Control

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The Tutorial Link

- You can find the tutorial link at:
  https://ctms.engin.umich.edu/CTMS/index.php?example=Introduction&section=ControlDigital

- We will do 3 topics in today's class:
  - Introduction: Digital Controller Design
  - Cruise Control Design
  - DC Motor Speed: Digital Controller Design

Report

- You need to submit a report after today's class (this report is considered as a HW assignment)

- You can generate a .pdf MATLAB report via the 'Publish' button.
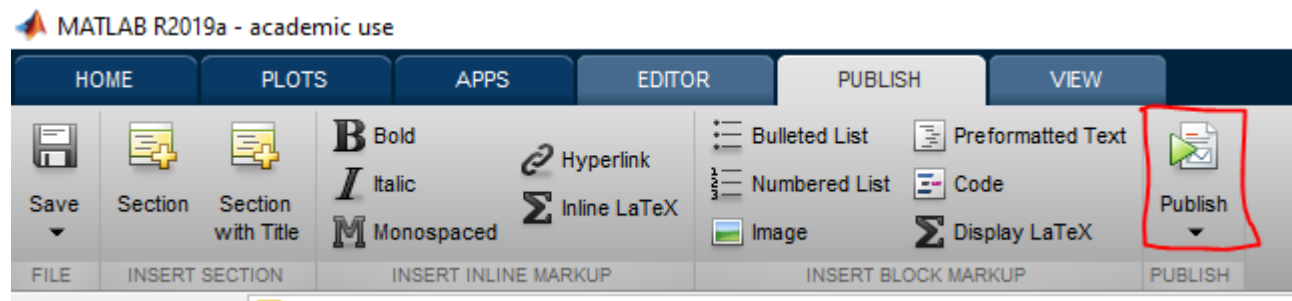
- The due date for this submission is **Feb. 27**th .

- The report needs to include the following sections

Introduction: Digital Controller Design

- Mass-Spring-Damper
    - Discrete transfer function
    - State Space Model
    - Pole-Zero Map
    - Step Response Plot
    - Discrete Root Locus Diagram

Cruise Control: Digital Controller Design

- Cruise Control Problem:
    - Discrete-time transfer function
    - Root Locus diagram in the z-Plane
    - Closed-loop step response
    - Compensation digital controller Root Locus
    - Step response of the closed-loop system with the compensation controller.

Motor Speed Control

- Motor Speed Control
  - The continuous transfer function
  - The discrete transfer function
  - The closed loop step response
  - The closed loop step response with original PID controller
  - The closed loop step response with PID + Compensator Controller.

Graduate Student Assignment: DC Motor Position Control

- DC Motor Position Control:
    - Continuous-time and Discrete-time TFs
    - Closed-loop Step Response
    - Root Locus Design and new Closed-loop Step Response