ABE 460
Review Session Exam #1

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ABE 460 Exam #1 Overview

- Wednesday October 17th, in class
- Closed Book and Notes; you may have a calculator
- 50 minutes
- Will provide difficult equations from the chapters, and any required charts/tables.
  - Laplace Transforms
    - Except basic differential equations to transfer function conversions
  - Second order step response
    - Time
    - Table of physical system equations

Chapter 1: Introduction

- Basic Control System Blocks
  - Review the general layout of a feedback control system and the common blocks.
- Common Types of Controllers
  - Microcontroller
  - PLC
  - Application Specific

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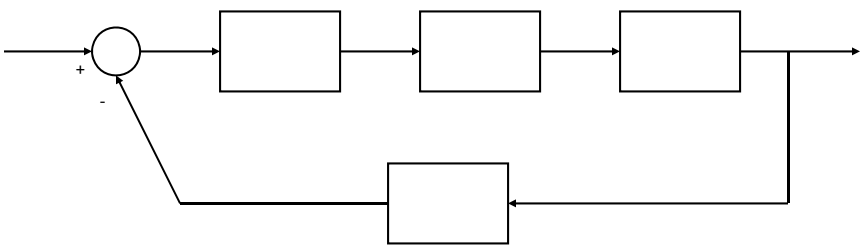

Chapter 2: Modeling Dynamic Systems

- Write the equations of motion for common physical systems (Differential equations)
  - Mechanical (Translational and Rotational)
  - Electrical
  - Hydraulic
  - Liquid Level
- Block Diagram Reduction
- Linearization

Chapter 3: Analysis Methods for Dynamic Systems

- Differential Equations
  - 1st and 2nd order step input responses
  - Generalized characteristics
- Laplace Transforms
  - Transfer functions
  - Characteristic Equation and Response Types
- Frequency Response Plots (Bode Plots)
  - Construction and Deconstruction
  - General Characteristics

Chapter 4: Analog Control System Performance

- Open loop versus Closed loop
  - Command and Disturbance Inputs
    - Steady State Errors from both
    - Transient response (stability)

For this exam you should be able to:

- Describe the basic components of a control system
- Organize and simplify control systems using block diagrams
- Model simple dynamic systems and processes (i.e. differential equations)
- Linearize non-linear systems and designate a valid linear region
- Develop transfer functions from the differential equations using Laplace transforms
- Describe and analyze step responses to first and second order systems
- Describe the system response in terms of the system poles (roots of the characteristic equation—denominator of the system transfer function)
- Identify the basic "factors" used in constructing/deconstructing Bode (frequency response) plots.
- Construct a Bode (frequency response) plot from a transfer function.
- Construct a transfer function from a Bode (frequency response) plot.
- Find the steady state errors resulting from command and/or disturbance inputs.