# ECE317
# Midterm Study Guide

- **This is a multiple-choice exam so bring a Scantron Form No. 882-E with you. These are available at the PSU bookstore. A pencil and erasure will also be needed.**
- **Calculators or any device that determines roots directly are NOT permitted to be used.**
- **You are permitted one sheet (8 ½ x 11) with notes. Written on both sides is OK.**

- The midterm covers homework exercises HW #1 to HW #6.
- It is highly recommended that you are able to answer all the quiz problems that were done in class throughout the term.

**Main topics:**

1) Application of Laplace transform

2) Block diagram reduction

3) Transient analysis:
   - i) First order systems, time constant, settling time
   - ii) Second order systems: types of responses, overdamped, critically damped, underdamped, undamped, damping factor, undamped natural frequency, settling time, %OS

4) Linearization of static nonlinearity (i.e. there are no derivatives used in describing the nonlinear system)

5) Stability:
   - i) Definitions of asymptotic and BIBO (bounded input, bounded output) stability
   - ii) pole locations
   - iii) stable/ marginally stable/ unstable

6) Stability analysis using Routh-Hurwitz
   - i) Examine the stability of polynomials, in particular being able to handle irregular cases:
     - a) Left hand column zero (with non-zero values to the right)
     - b) Rows of all zeros in the Routh table
   - ii) Stability analysis of a system dependent on a parameter(s) to find the stable range for the parameter(s).

7) Sinusoidal steady state response

8) Labs:
   - i) Lab content
   - ii) PECS