Exam 3 Study Guide   Exam 3 is Fri, 4/7/17

The exam will be **closed book**, but you may use the colored sheets from exam 1 and 2 the new one for exam 3.

Download old exams from HW page on class web site.

The exam will cover

1. **Root - Locus method**

   a) **Main rules** (memorize, could be in closed-book part)

   b) **Gain at any point** on the root locus: $k = \dfrac{1}{|G(s)|}$ (both parts)
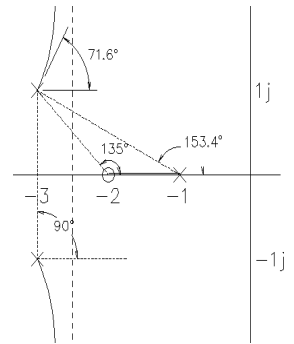
   c) Additional rules.   Open-book part only.

   The **breakaway points** are also solutions to: $\displaystyle\sum_{all} \frac{1}{(s+-p_i)} = \sum_{all} \frac{1}{(s+-z_i)}$ Open-book part only.

   Phase angle of $G(s)$ at any point on the root locus: $\arg(G(s)) = \arg(N(s)) - \arg(D(s)) = \pm 180^o, \pm 540^o, \dots$

   Or: $\arg\left(\dfrac{1}{G(s)}\right) = \arg(D(s)) - \arg(N(s)) = \pm 180^o, \pm 540^o, \dots$

   Departure angles from complex poles: Example. $180 - 90 - 153.4 + 135 = 71.6$ deg

2. **Root - Locus Interpretation and design**

   Concepts of what a root locus plot is and what it tells you. Movement of poles

   Good vs bad, fast response vs slow, OK damping vs bad.

   Compensators
   Know pole & zero locations of P, PI, lag, PD, lead & PID Compensators.
   PI and Lag, purpose and design, ties in with steady-state error
   PD and Lead, purpose and design ties in with root locus angle rules

3. **Unconventional root-locus**

4. Phase-locked loops   Material from labs   How and why did you use an unconventional root-locus
                              How does it work   The loop block diagram

5. Compensator circuits & Instrumentation amplifier

6. PID tuning, memorize some basic ideas, like why you would need to do it.

7. Concentrate on Homeworks RL1 - FC2 I'll scan through for problems

8. Up to Lab 7 (Advanced PLL)

9. Download old exams from HW page on class web site. But remember, they may cover more than we did in our class.

Homework for ME Design Day has been canceled due to conflict with ECE Technical Open House
BUT, If you get a chance:

Go to ME Design day in the Union on Thursday, 4/20 sometime from 11:00 to 3:00.
See www.mech.utah.edu/events/designday.html   Look for:

  1. Control systems and/or systems with feedback.

  2. Senior project that impress you.

  3. Competitions (main mechatronics robot competition, 1:00 - 3:00).   ECE 3510   Exam 3 Study Guide