EEL 301 Homework #6

Issued: 13.03.2013

ROOT-LOCUS

Question 1. Solve *Ogata, Problem B-6-1. (Pg. 394)*. Additionally,

a) Compare the root-locus plot with *Ogata, Example A-6-1. (Pg. 347)*.

b) For *Problem B-6-1.*, set $s = \sigma + j\omega$ and obtain analytical equations for the root-locus. Compare this way of getting analytical equations with that used in *Ogata, Example 6-2. (Pg. 279)*.

Question 2. Solve *Ogata, Problems B-6-2 & B-6-3. (Pg. 394)*. Compare the root-locus plot with *Ogata, Example A-6-6. (Pg. 355)*. (Hint: Try sketching root-locus without computing break points).

Question 3. Solve *Ogata, Problem B-6-5. (Pg. 394)*. Additionally,

a) Compare this root-locus plot with *Example A-6-2 & A-6-3. (Pg. 349-352)*. In particular, note how changing location of zero modifies the overall shape of the root-locus sketch.

b) Refer *Example A-6-4. (Pg. 352)* for an illustration of computing exact root-locus.

Question 4. Solve *Ogata, Problem B-6-7. (Pg. 394)*. (Hint: Try sketching root-locus without computing break points).

Question 5. Solve *Ogata, Problem B-6-8. (Pg. 394)*. Compare the root-locus plot with *Ogata, Example A-6-5. (Pg. 353)*, noting the effect of a slight change in location of open-loop poles.

Question 6. Solve *Ogata, Problem B-6-4. (Pg. 394)*.

Question 7. Solve *Ogata, Example A-6-7. (Pg. 394)*.

Using ROOT-LOCUS for DESIGN

Question 8. Solve *Ogata, Problem B-6-15. (Pg. 395)*.

Question 9. Solve *Ogata, Problem B-6-16. (Pg. 395)*. Refer *Ogata, Example A-6-14. (Pg. 372)* for another PD controller design.

Question 10. Solve *Ogata, Problem B-6-18. (Pg. 395)*. (Hint: May consider placing two lead compensators in cascade if the angle deficiency is too large.)

Question 11. Solve *Ogata, Problem B-6-20. (Pg. 396)*. Refer *Ogata, Example A-6-15. (Pg. 374)* for another lag compensator design.

Question 12. Solve *Ogata, Problem B-6-21. (Pg. 396)*.

Question 13. For lag-lead compensator design, refer *Ogata, Examples A-6-16 & A-6-17. (Pg. 377-384)*.

Question 14. Solve *Ogata, Problem B-6-22. (Pg. 396)*.

Question 15. Solve *Ogata, Problem B-6-26. (Pg. 397)*. Refer *Ogata, Example A-6-19. (Pg. 390)* for similar design.