

ECE 3510 homework # 15

A.Stolp a

You may sketch these using a computer program.

1. A compensator: $C(s) = \frac{s+2a}{s+a}$ and a plant: $P(s) = \frac{k_p}{s+6}$ are combined to form an open-loop

transfer function: $G(s) = \frac{k_p}{(s+6)} \cdot \frac{(s+2a)}{(s+a)}$

- Sketch a conventional root-locus plot taking k_p as the gain and $a = 2$.
- Sketch a conventional root-locus plot taking k_p as the gain and $a = 4$.
- Sketch a nonconventional root-locus plot taking a as the "gain". k_p is not specified.
- Sketch a nonconventional root-locus plot taking a as the "gain" and $k_p = 2$.
- What are the closed-loop poles if $a = 4$ and $k_p = 2$? Show that these poles fit on the root locus drawn in part b) as well as the root locus drawn in part d).

2. A compensator: $C(s) = \frac{a}{s+a}$ and a plant: $P(s) = \frac{k_p \cdot s}{(s+4)^2}$ are combined to form an open-loop transfer function.

- Sketch a conventional root-locus plot taking k_p as the gain and some $a < 4$.
- Sketch a conventional root-locus plot taking k_p as the gain and some $a > 4$.
- Sketch a nonconventional root-locus plot taking a as the "gain" and $k_p = 2$.

Answers

