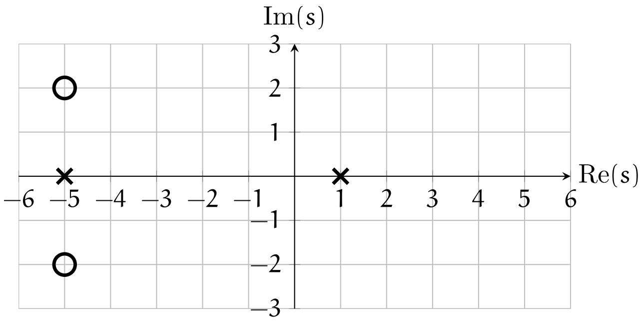
rlocus.exe Exercises for Chapter rlocus

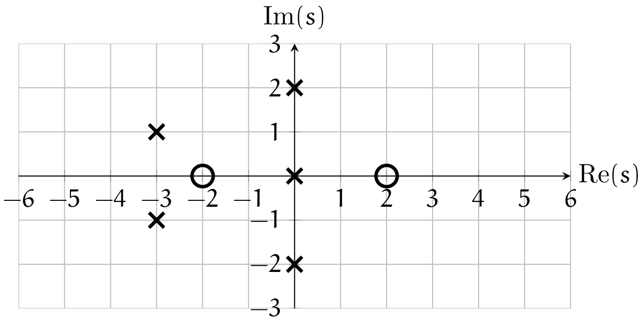
Exercise rlocus.burritosteve

Given the open-loop pole-zero plots below, sketch the root locus plots (use this sheet) for positive controller gain K.

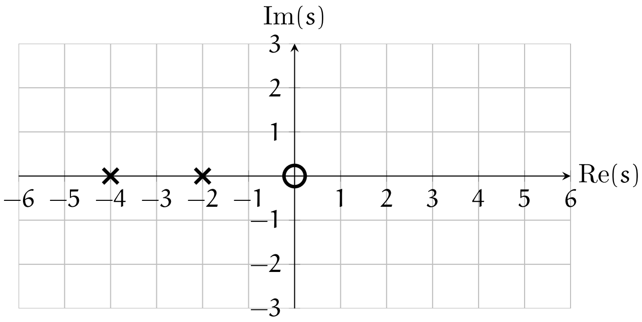
a.



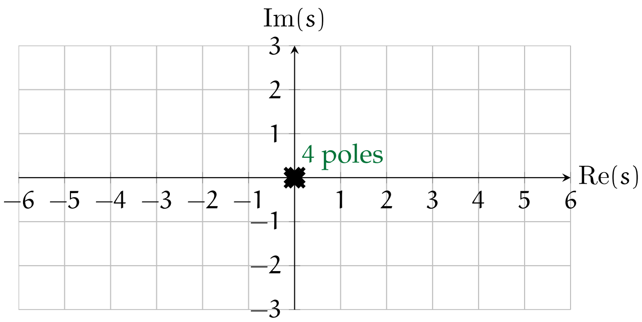
b.



c.



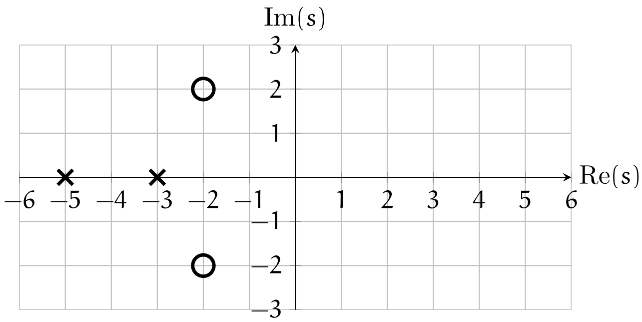
d.



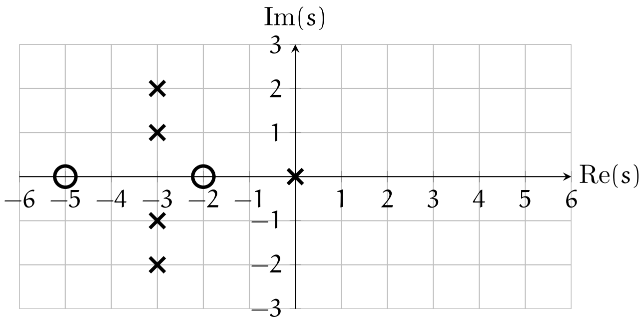
Exercise rlocus.dunnage

Given the open-loop pole-zero plots below, sketch the root locus plots (use this sheet) for positive controller gain K.

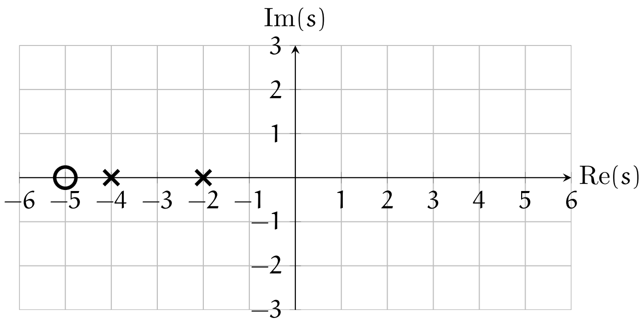
1.



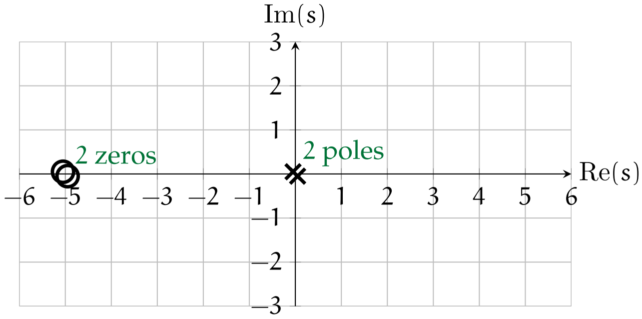
2.



3.



4.

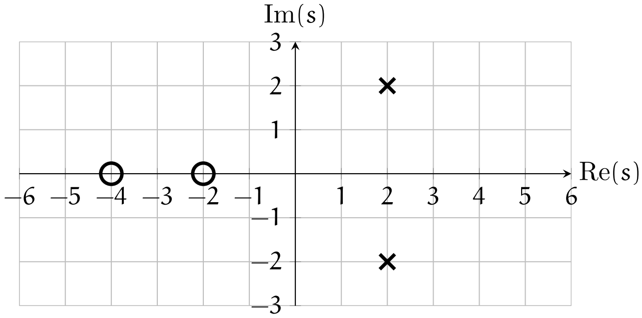


Exercise rlocus.respite

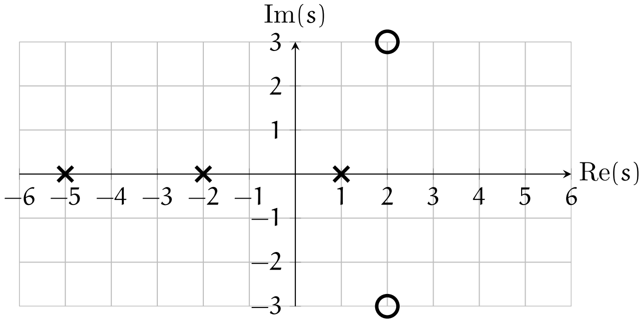
Given the open-loop pole-zero plots below, sketch the root locus plots (use this sheet) for positive controller gain K. Comment on the stability of each system. For example, the system is stable for all gain K, or it becomes unstable as K increases.

______/20 p.

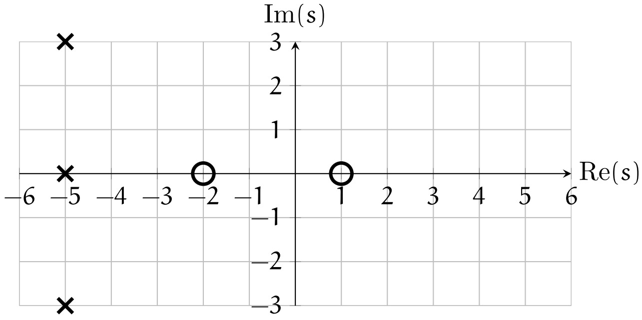
1.



2.



3.



rldesign

Root–locus design

In root locus design, our task is to place the dominant closed-loop poles such that the closed-loop system

1. is stable (Chapter stab),
2. has desirable transient response performance characteristics (Chapter trans), and
3. has desirable steady-state response characteristics (Chapter steady).

Several types of controllers can be designed using these techniques. The most basic is gain control (Lec. rldesign.P), which gives us a single parameter—the loop gain—for controller design. The others we consider here are of two main types: proportional-integral-derivative (PID) and proportional-lead-lag. The two are quite similar, but the latter can be implemented with passive circuits, whereas the former require active circuits.