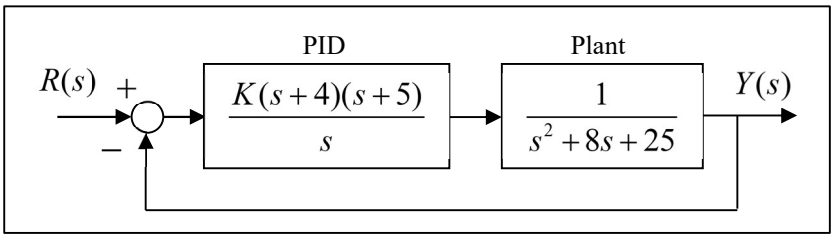
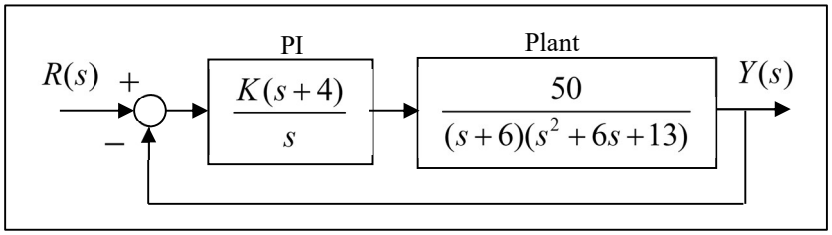
Introductory Control Systems
Exercises #14 – Root Locus Diagrams

For each of the closed-loop systems shown below, ***sketch*** the root locus diagram for $K \geq 0$. ***Identify*** the locations where $K = 0$ and ***indicate*** the directions of ***increasing*** K along the branches. Also, ***indicate*** the approximate locations of any break points.

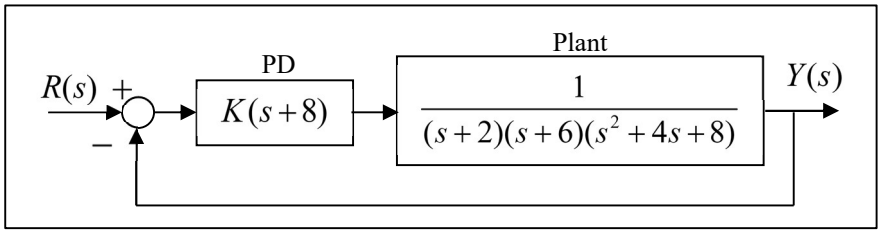
1. A ***proportional/integral/derivative*** ("PID") controller is used to control a 2nd order plant with negative unity feedback as shown. ***Sketch*** the root locus diagram.



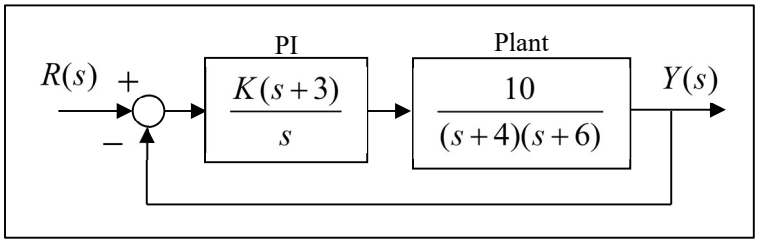
2. A ***proportional/integral*** ("PI") controller is used to control a 3rd order plant with negative unity feedback as shown. ***Sketch*** the root locus diagram.



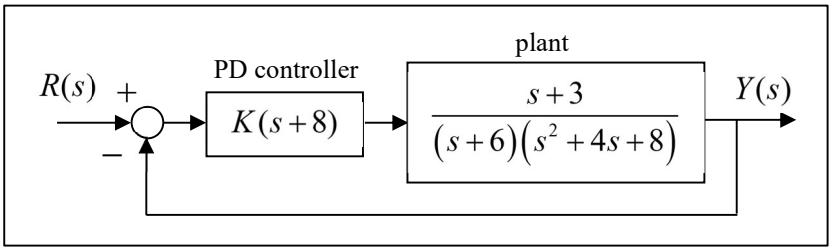
3. A ***proportional/derivative*** ("PD") controller is used to control a 4th order plant with negative unity feedback as shown. ***Sketch*** the root locus diagram.



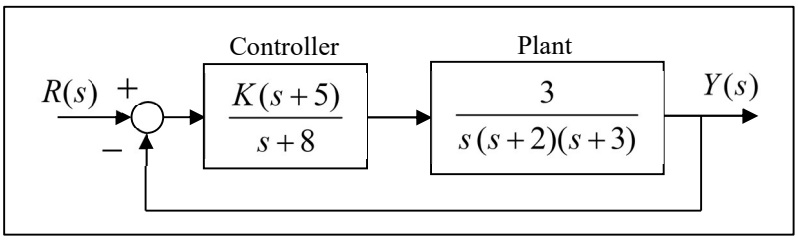
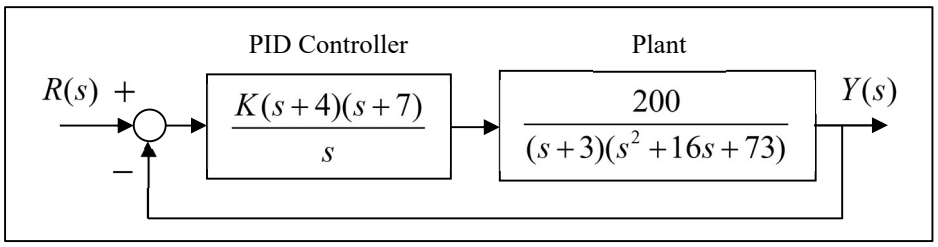
4. A ***proportional/integral*** ("PI") controller is used to control a 2nd order plant with negative unity feedback as shown. ***Sketch*** the root locus diagram.



5. A ***proportional/derivative*** ("PD) controller is used to control a 3rd order plant with negative unity feedback as shown. ***Sketch*** the root locus diagram.



6. A ***phase-lead*** controller is used to control a 3rd order plant with negative unity feedback as shown. ***Sketch*** the root locus diagram.



7. A ***proportional/integral/derivative*** ("PID") controller is used to control a 3rd order plant with negative unity feedback as shown. ***Sketch*** the root locus diagram.