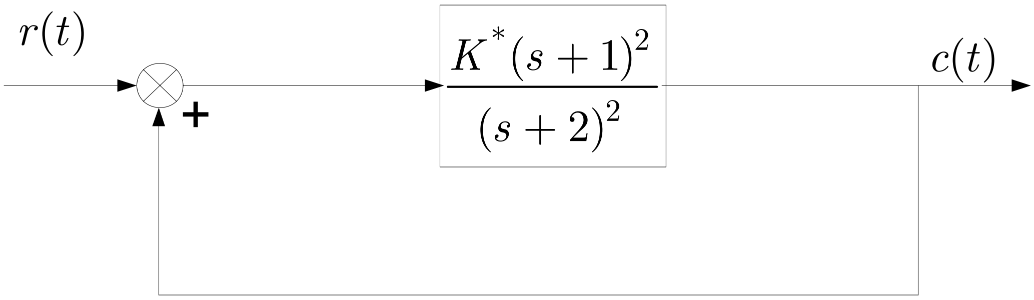
1. A block diagram of a positive feedback system is shown below:

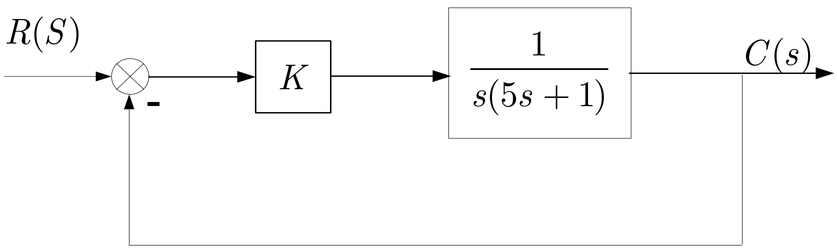


Sketch the root loci when K* varies from 0 to $+\infty$.

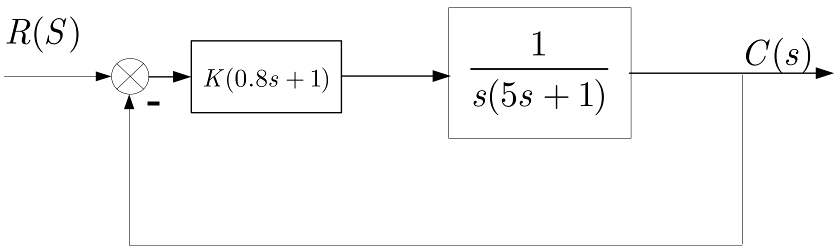
2. The open-loop transfer function of a servo control system is

$$G(s)H(s) = \frac{1}{s(5s+1)},$$

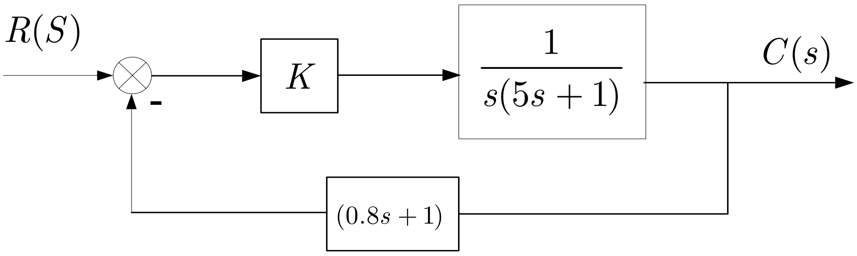
To improve the system's performance, proportional controller K, PD controller $K(0.8\text{s}+1)$ and feedback controller are used and are shown in the following block diagrams (a), (b) and (c), respectively. Sketch, for the three cases, the corresponding root loci when K varies from 0 to $+\infty$.



(a)



(b)



(c)

3. The open-loop transfer function of a unity-feedback system is

$$G(s)=\frac{K^{*}(s+3)}{s(s+2)(s^{2}+10s+50)},$$

Sketch root loci when K* varies from 0 to $+\infty$.

4. The open-loop transfer function of a unity feedback is

$$G(s)=\frac{K^{*}(s+1)}{s(s+0.5)(s^{2}+10s+50)}$$

Sketch the root loci when K* varies from 0 to $+\infty$.

5. The open-loop transfer function of a unity feedback is

$$G(s)=\frac{K^{*}(s+10)}{s(s+1)(s+4)^{2}}$$

Sketch the root loci when K* varies from 0 to $+\infty$.

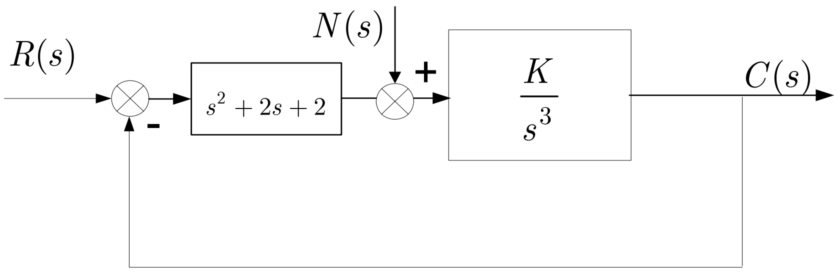
6. The open-loop transfer function of a control system is

$$G(s)=\frac{K^{*}(s+1)}{s^{2}(s+2)(s+4)}$$

Sketch, for negative feedback and positive feedback cases, the root loci when K* varies from

0 to $+\infty$.

7. A block diagram of control system is shown below:



Sketch the root loci when K* varies from 0 to $+\infty$ and determine the range of K for which the system is stable.