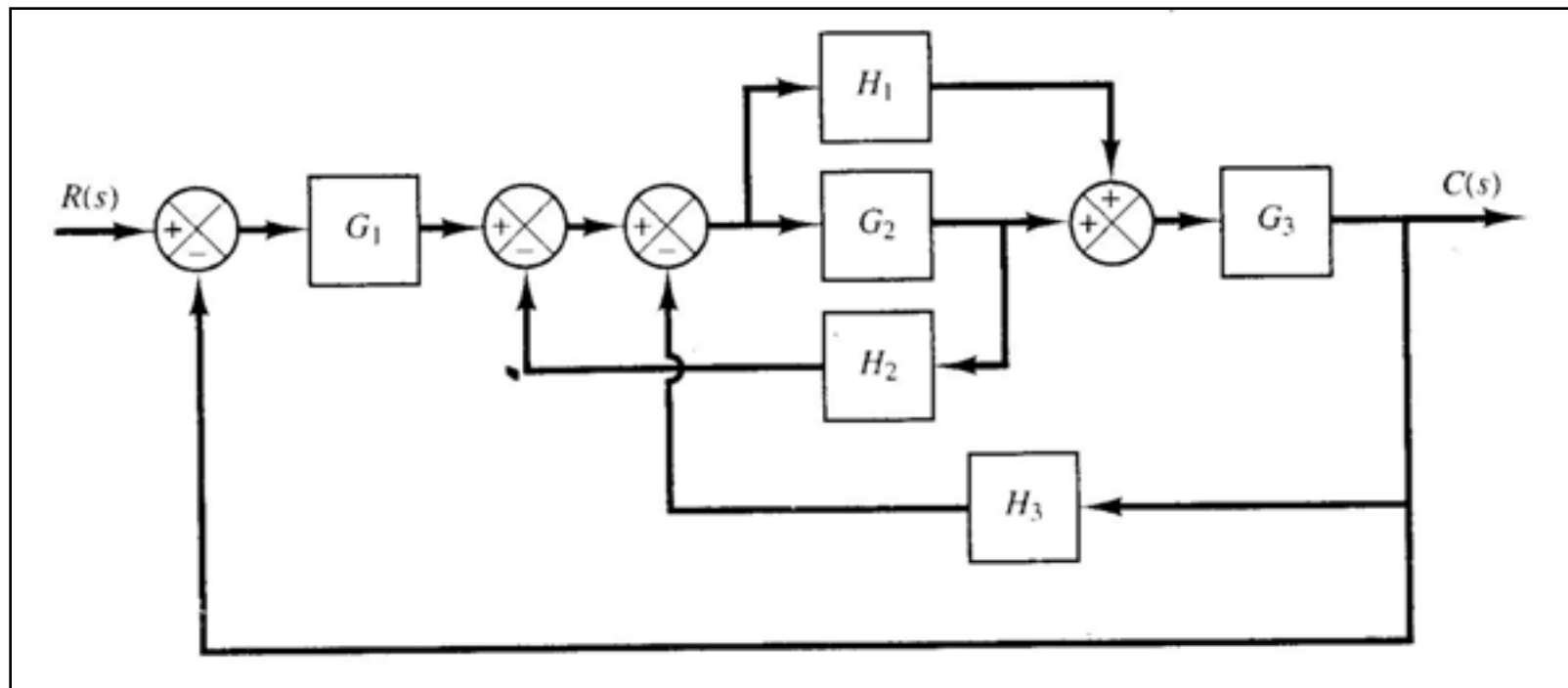




Block Diagram Reduction

For the **system** given below, obtain equivalent **single loop representation** (C/R) using the block diagram **reduction** technique.





Block Diagram Reduction

Steps:

1. **Interchange** two consecutive summing junctions.
2. **Shift** H_1 take-off point to the right of G_2 .
3. **Shift** H_2 take-off point to the left of G_2 .
4. **Reduce** all decoupled loops as per standard formula.

$$\begin{aligned}\frac{C}{R} &= \frac{G_1(G_2 + H_1)G_3}{1 + G_2H_2 + H_3(G_2 + H_1)G_3 + G_1(G_2 + H_1)G_3} \\ &= \frac{G_1G_2G_3 + G_1H_1G_3}{1 + G_2H_2 + G_2G_3H_3 + G_1G_2G_3 + G_3H_1H_3 + G_1H_1G_3}\end{aligned}$$