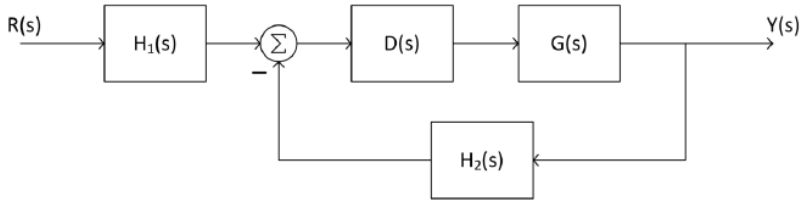
Example:

- Calculate the closed-loop transfer function

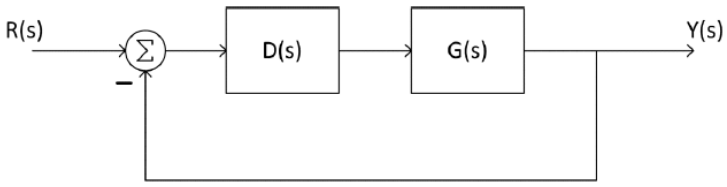


- $D(s)$ and $G(s)$ are in cascade
- $H_1(s)$ is in cascade with the feedback system consisting of $D(s)$, $G(s)$, and $H_2(s)$

$$T(s) = H_1(s) \cdot \frac{D(s)G(s)}{1 + D(s)G(s)H_2(s)}$$

$$T(s) = \frac{H_1(s)D(s)G(s)}{1 + D(s)G(s)H_2(s)}$$

Example: Calculate the transfer function of the following unity-feedback system:



- Feedback path gain is unity
  - Can always reconfigure a system to unity-feedback form
- Closed-loop transfer function is:

$$T(s) = \frac{D(s)G(s)}{1 + D(s)G(s)}$$

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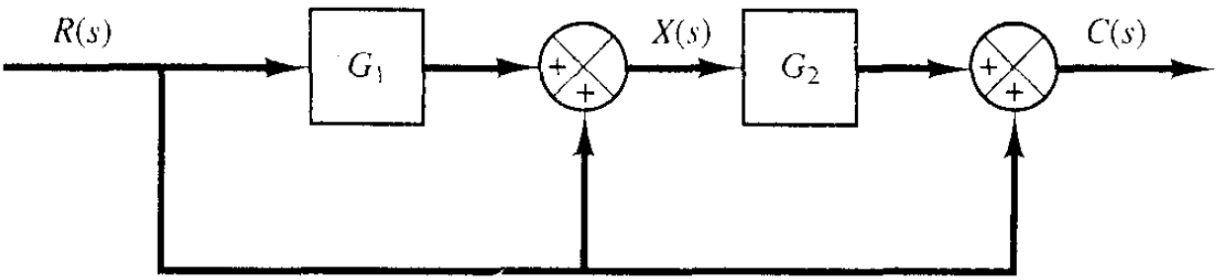
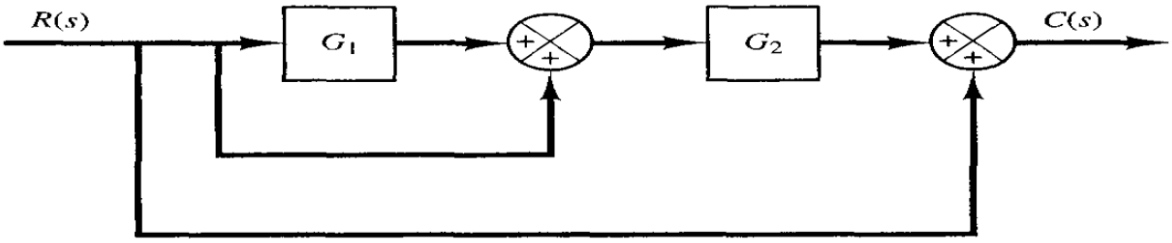
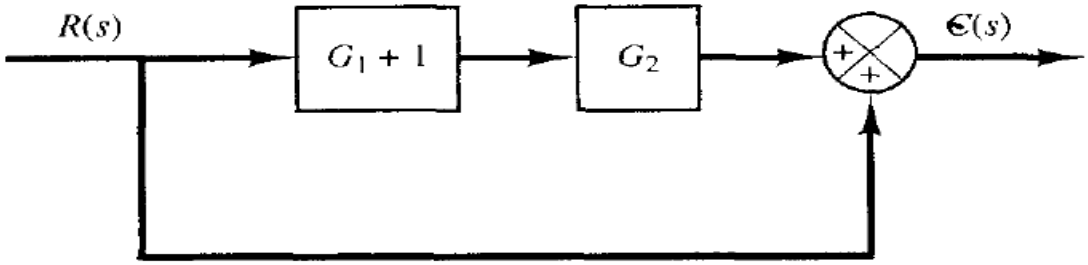
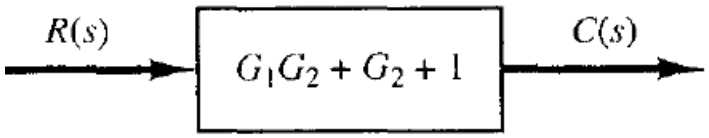
Simplify the block diagram shown in below Figures. Obtain the transfer function relating C(s) and R(s).

Examples 3:









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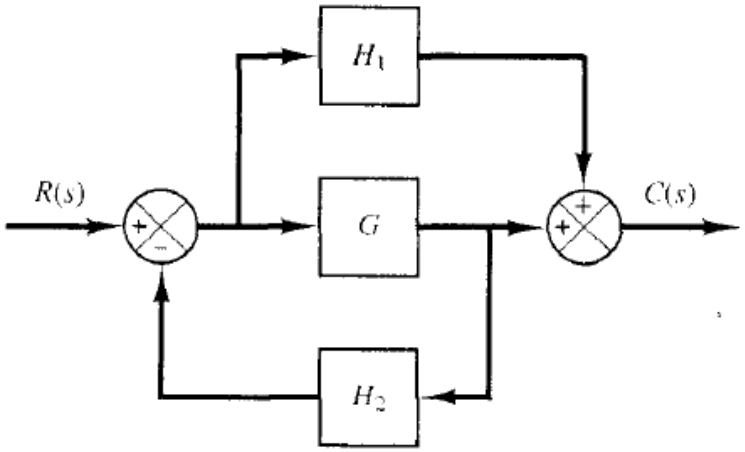
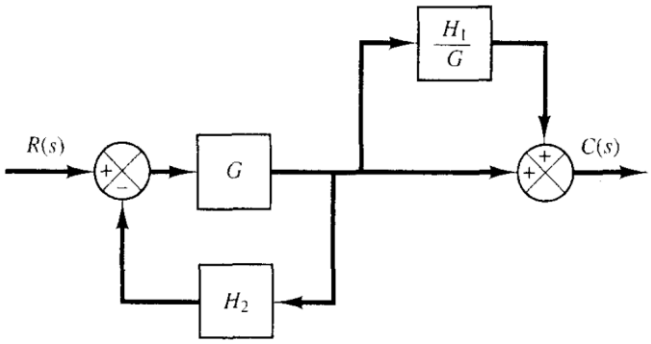
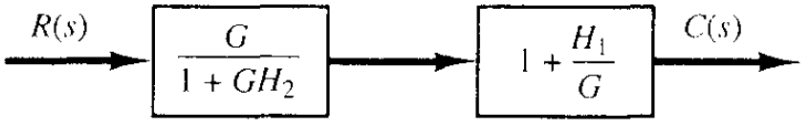
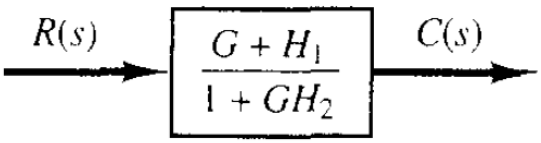
Examples 4:









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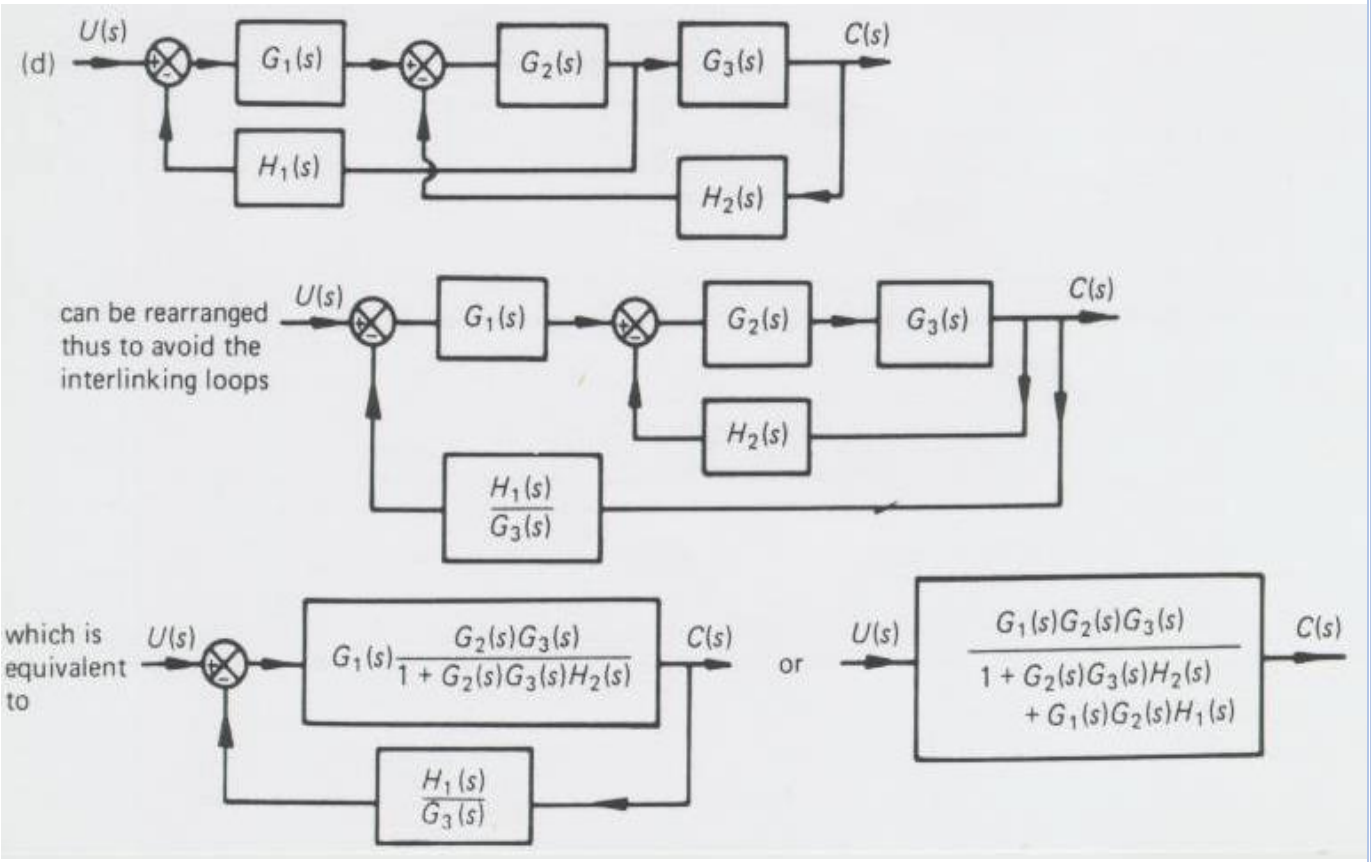
Examples 5:


(d)
U(s)
G1(s)
G2(s)
G3(s)
C(s)
H1(s)
H2(s)
can be rearranged thus to avoid the interlinking loops
U(s)
G1(s)
G2(s)
G3(s)
C(s)
H2(s)
H1(s)/G3(s)
which is equivalent to
U(s)
G1(s) G2(s)G3(s) / 1 + G2(s)G3(s)H2(s)
C(s)
H1(s)/G3(s)
or
U(s)
G1(s)G2(s)G3(s) / 1 + G2(s)G3(s)H2(s) + G1(s)G2(s)H1(s)
C(s)