

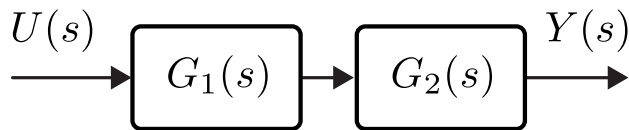
## Lecture 4

*Lecturer: Asst. Prof. M. Mert Ankarali*

## 4.1 Block Diagrams &amp; Simplifications

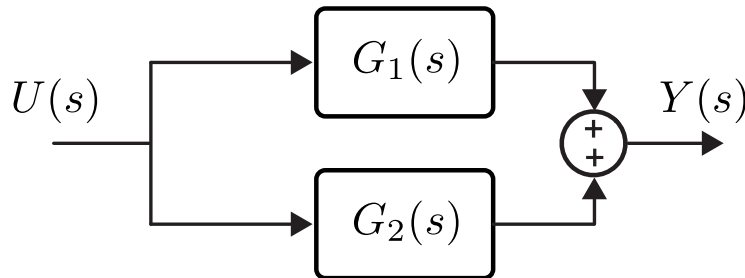
## 4.1.1 Fundamental Block Diagram Topologies

## Cascaded (Series) Block Diagrams



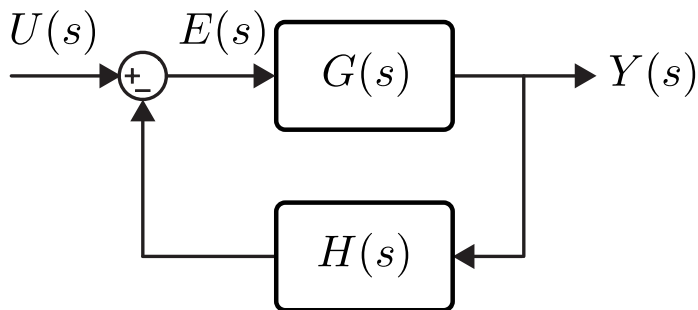
$$\frac{Y(s)}{U(s)} = \bar{G}(s) = G_1(s)G_2(s)$$

## Parallel Block Diagrams



$$\frac{Y(s)}{U(s)} = \bar{G}(s) = G_1(s) + G_2(s)$$

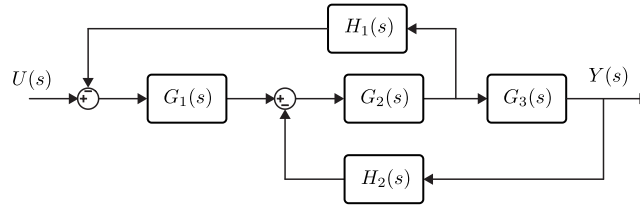
## Negative Feedback Loop



$$\begin{aligned} E(s) &= U(s) - H(s)Y(s) \\ E(s)(1 + H(s)G(s)) &= U(s) \\ \frac{Y(s)}{U(s)} = \bar{G}(s) &= \frac{G(s)}{1 + H(s)G(s)} \end{aligned}$$

### 4.1.2 Examples

**Ex 1:** Simplify the following block-diagram topology



**Solution:**

