ELE 321
Linear System Analysis

Ankara University

Faculty of Engineering

Electrical and Electronics Engineering Department

Continuous-Time and Discrete-Time Systems

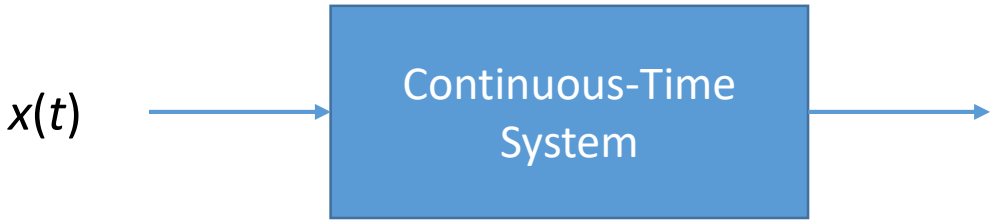
ELE321 Linear System Analysis

Lecture 6

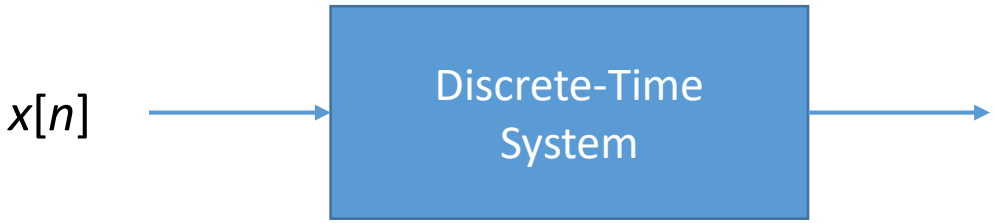
Agenda

- Systems
- System connections
- Basic system properties

Continuous-Time and Discrete-Time Systems

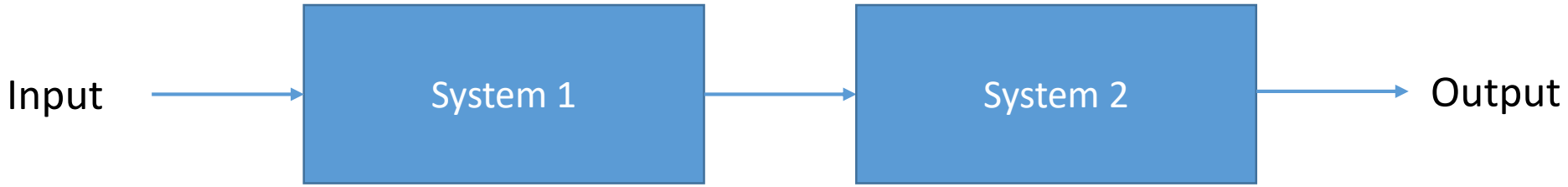


$$x(t) \rightarrow y(t)$$

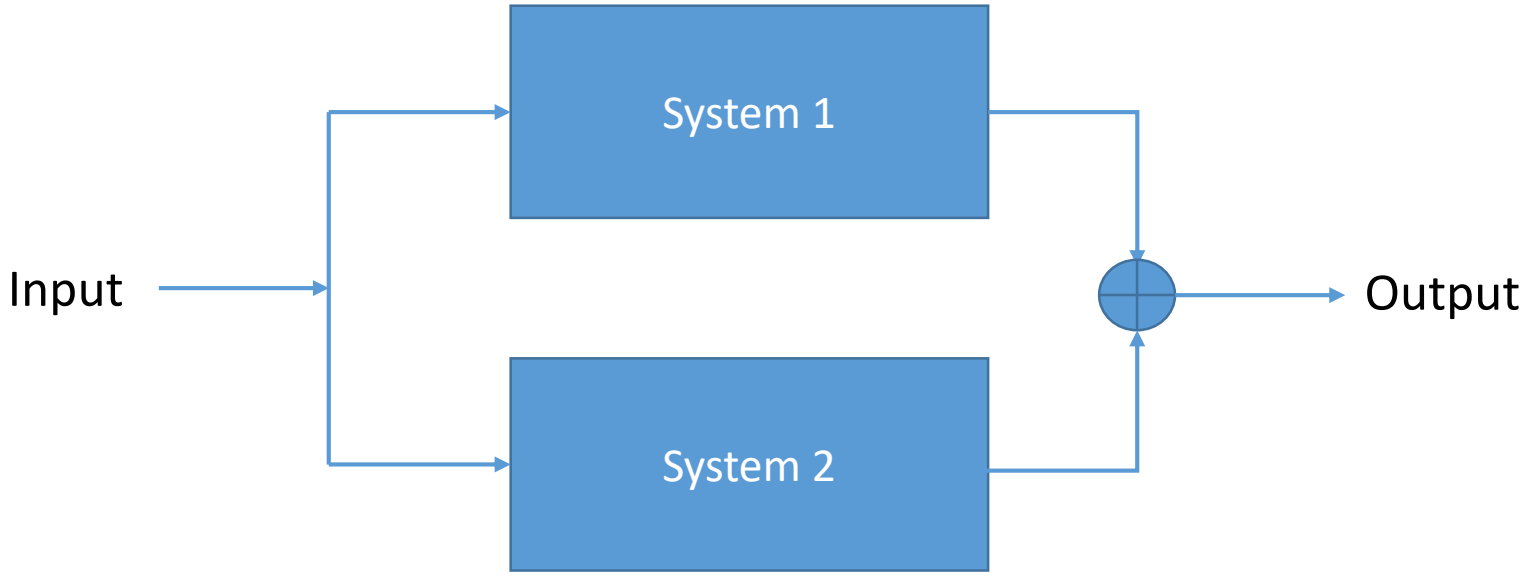


$$x[n] \rightarrow y[n]$$

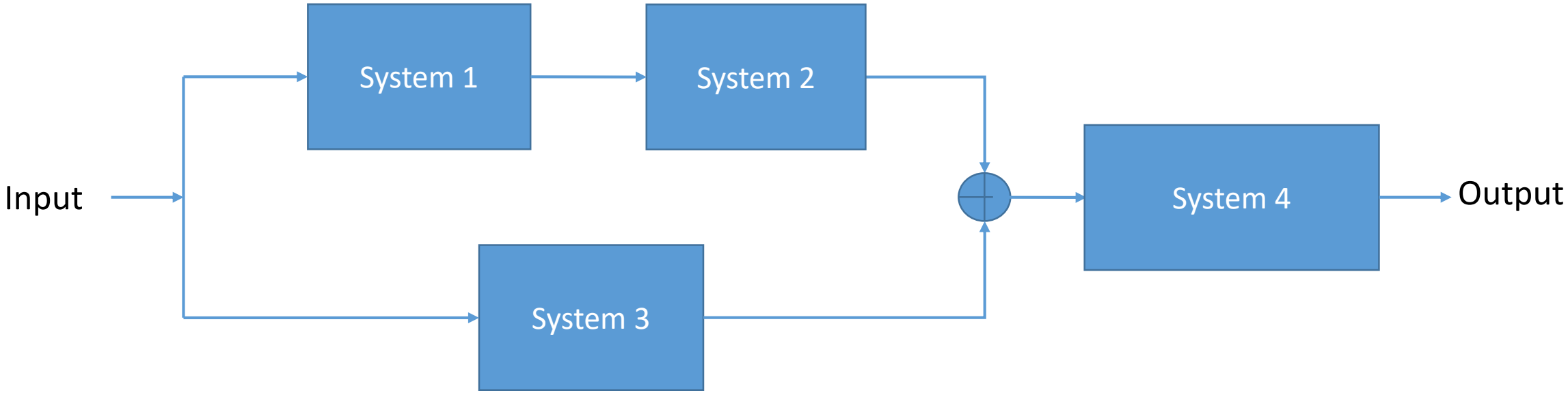
Interconnection of Systems



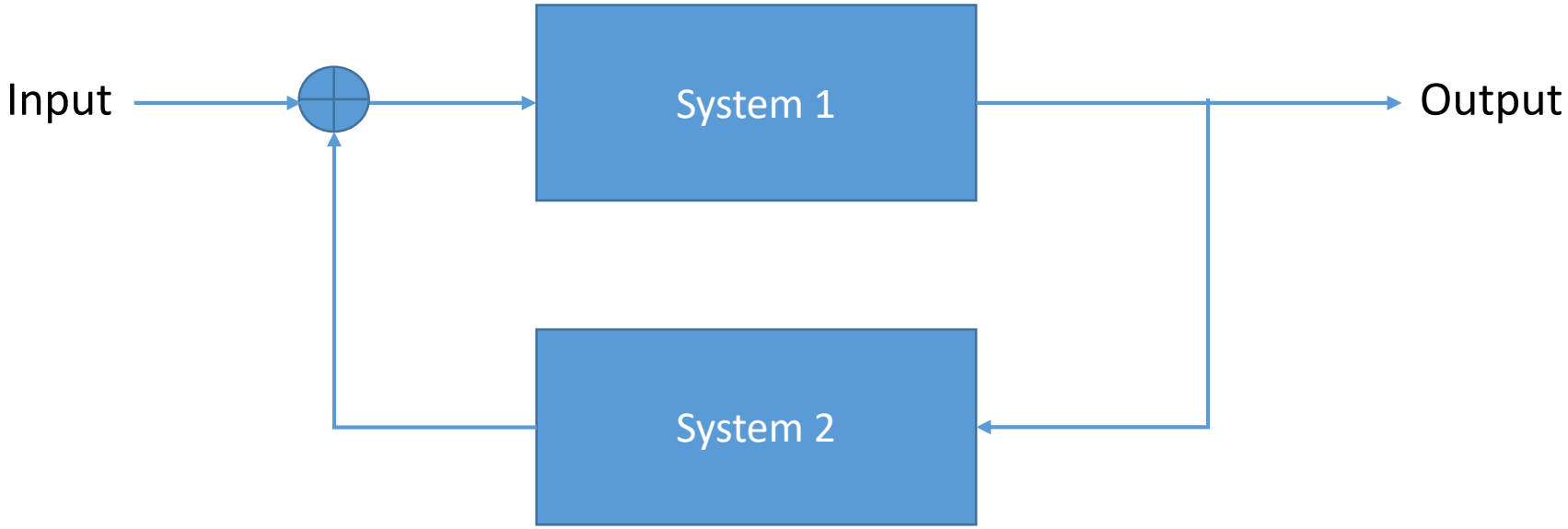
Series (Cascade) Interconnection



Parallel Interconnection



Series-Parallel Interconnection



Feedback Interconnection

Basic System Properties

- Systems with and without Memory

  Memoryless System: Output given at a time depends only on the input at the same time.

  If not, system is with memory.

- Invertibility of Systems

  A system is invertible if distinct inputs lead to distinct outputs. Then there is inverse system.

- Causality

  A system is causal if output at any time is dependent only on the input values at the present and past time. It does not depent on future values of the input.

- Stability

  Bounded input → Bounded Output

- Time Invariance

  Time shift in the input results in identical time shift in the output.

- Linearity

  Weithted sum of input signals results in weighted sum of the responses of the system to each of input signals.

References

- Signals and Systems, 2nd Edition, Oppenheim, Willsky, Nawab