Lecture 6 — Properties of Linear Time Invariant Systems

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- Changing the order of cascaded LTI systems does not change the overall response (commutative)
- You can determine the overall response by first applying the input to the first system, computing its output, and then using that output as the input to the second system; alternatively, you can find the impulse response of the equivalent system, $h_{eq} = h_1 * h_2$, and use it to find the overall response, $y = x * h_{eq}$ (associative)
- Two systems in parallel with a single input can be added together to find the output, $y = x * (h_1 + h_2)$ (distributive)
- If an invertible system is cascaded with its inverse system, the output will be the same as the input; the system formed by cascading an invertible system with its inverse is referred to as the identity system ($y(t)/y[n] = x(t) * h(t) * h_i(t)/x[n] * h[n] * h_i[n] \rightarrow y(t)/y[n] = x(t)/x[n]$)
  - Known as the identity LTI system