# EE 101: Basic Electronics

## Introduction to Analog Signal Processing Circuits

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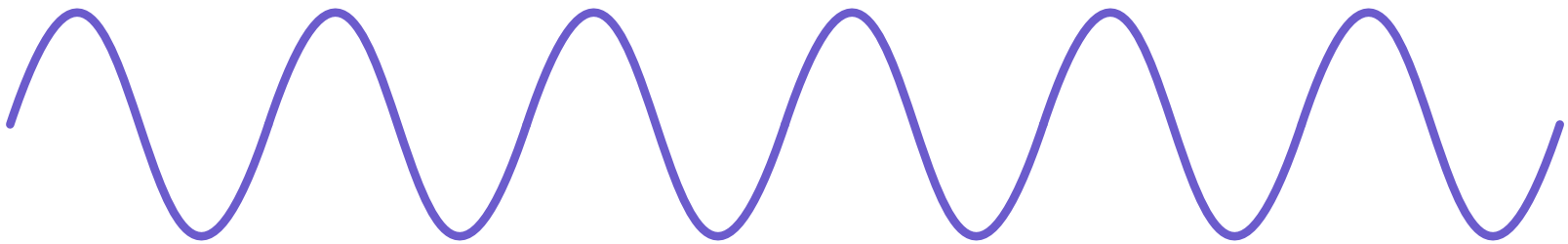
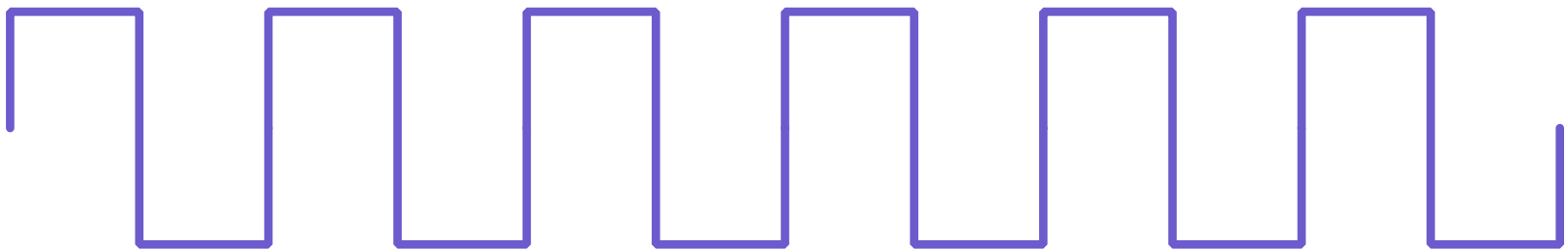
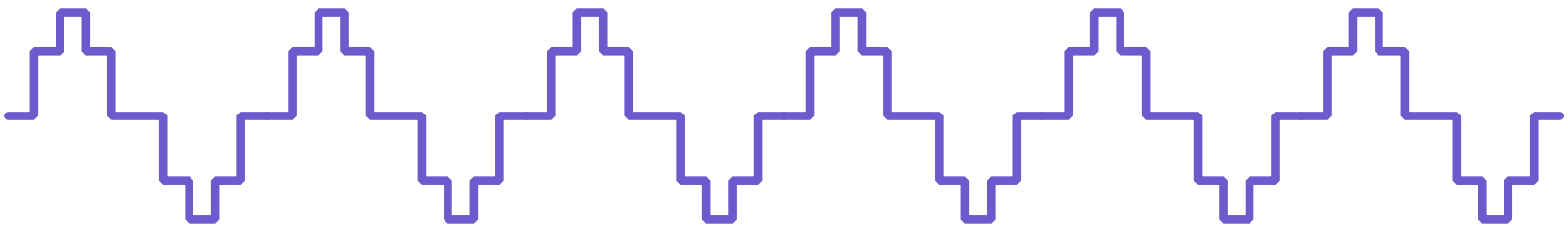
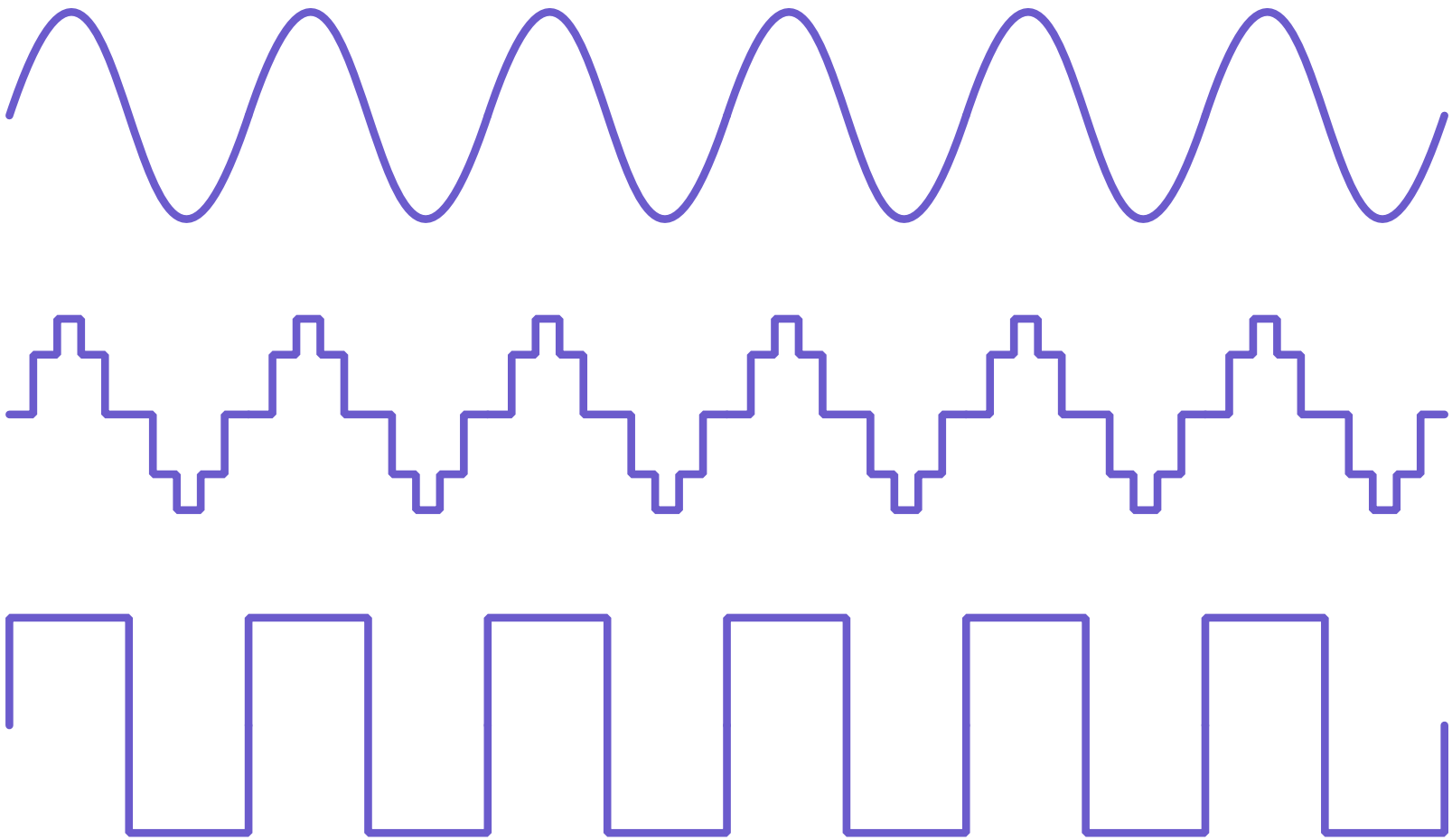






# Signals: Analog, Discrete, Digital



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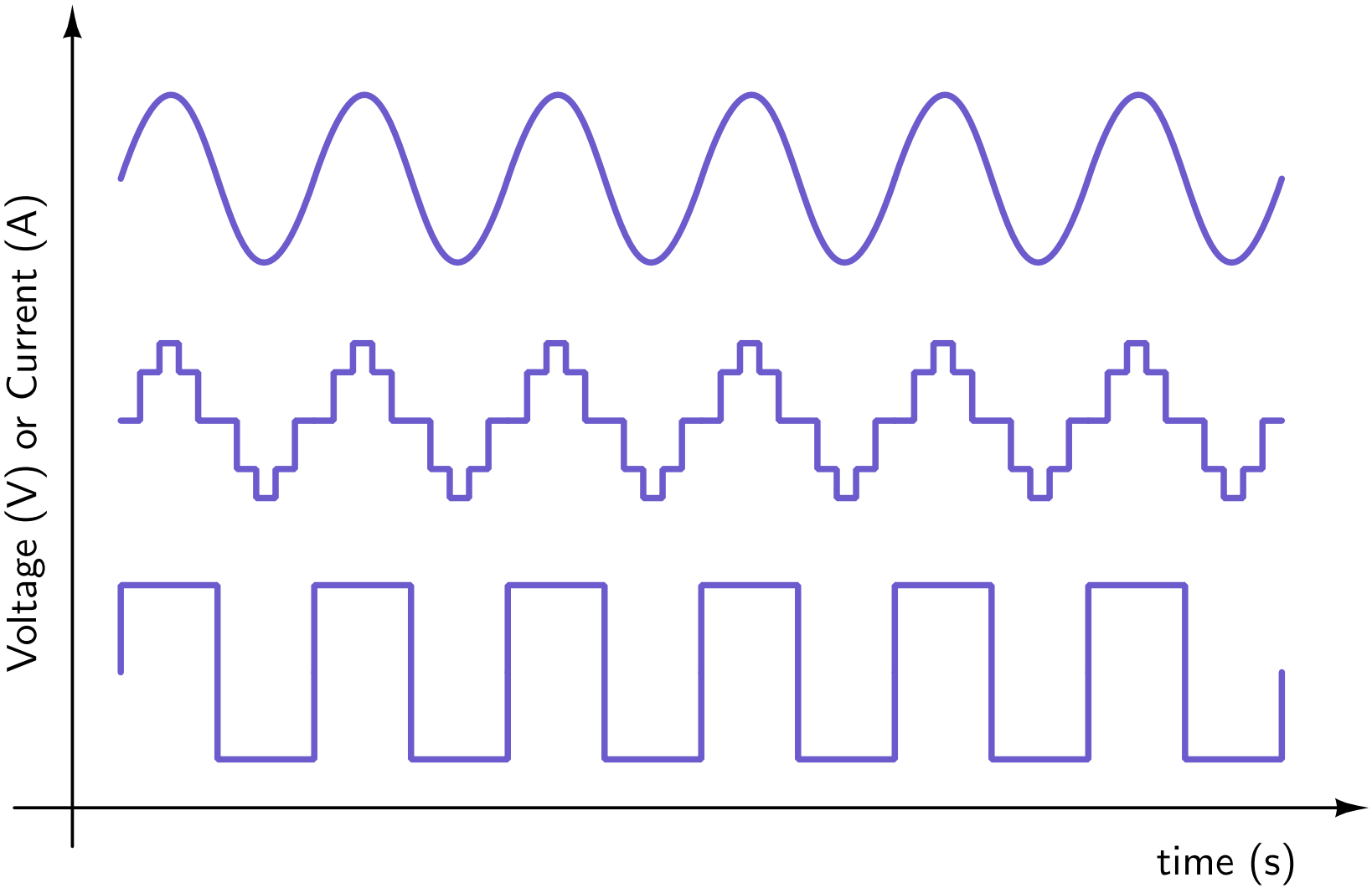
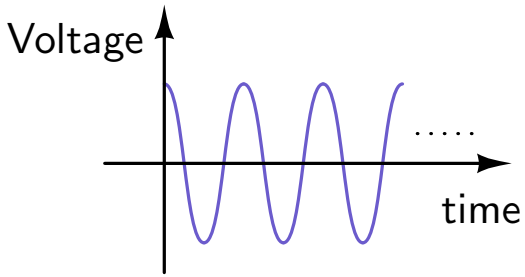
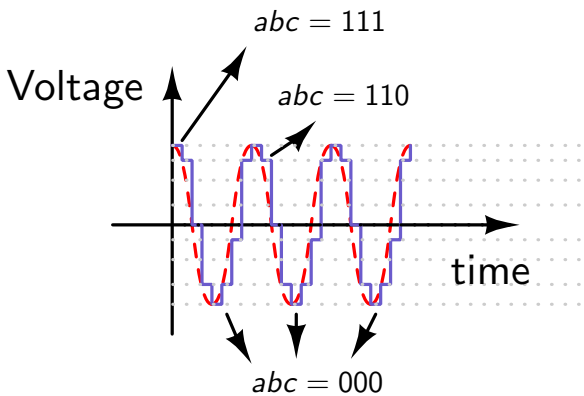


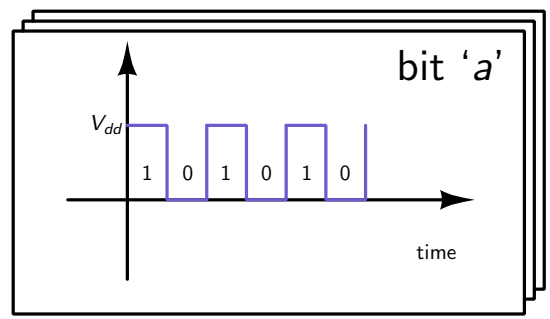
# Conversion of a Signal: Analog→Discrete→Digital




Continuous-amplitude

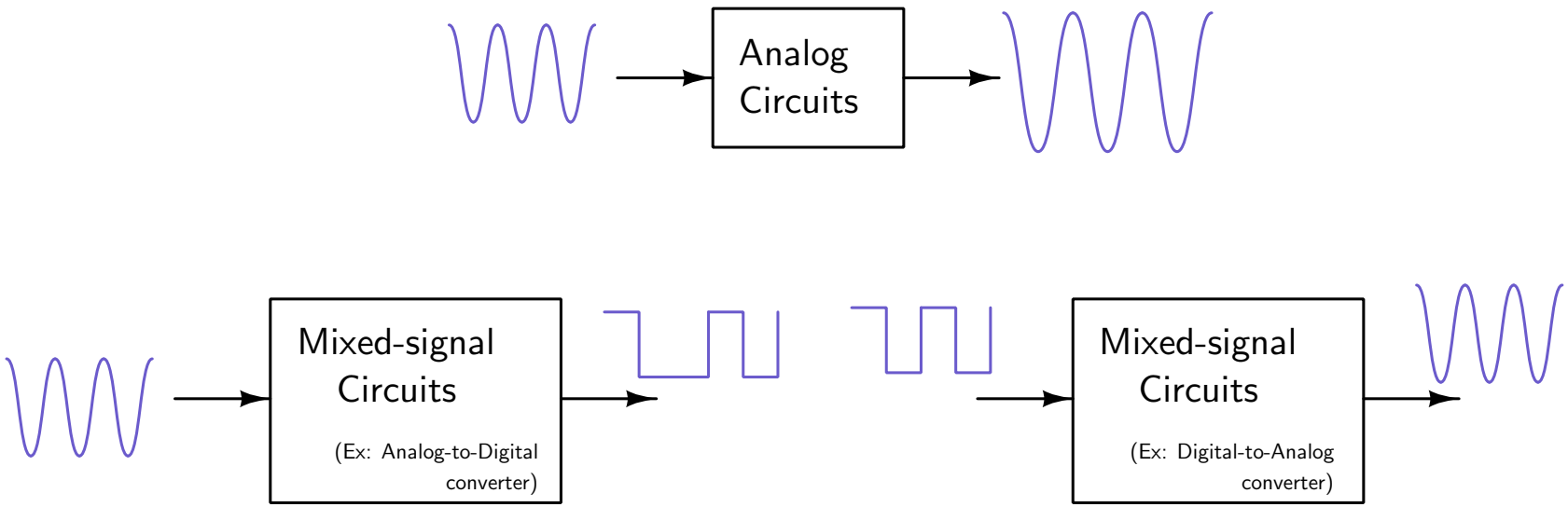



Discrete-amplitude




Digital signals (bits)

# Analog and Mixed Signal Circuits



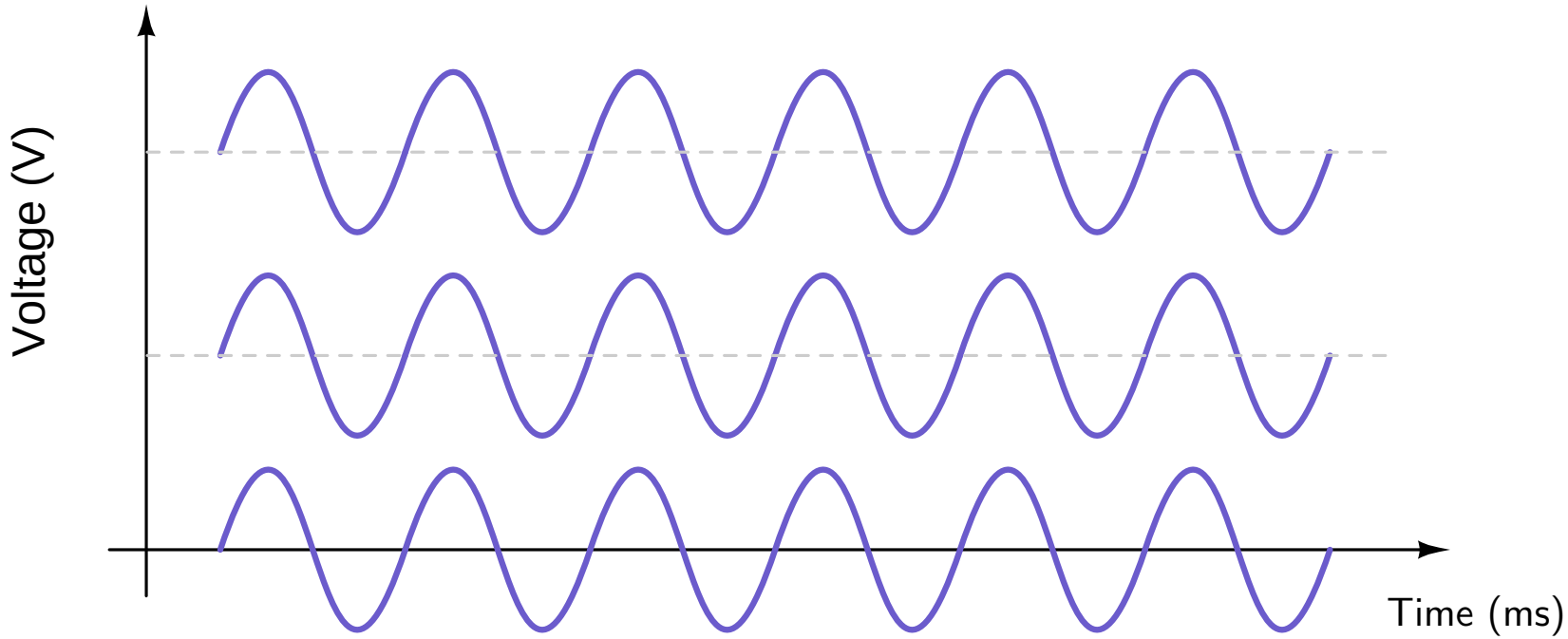
# Why Analog?: Few articles to read

- "The World is Analog"
- "Engineering the world through Analog"
- "Connecting Bits to Life"
- "Secrets of the Universe - or - Look What Happened to Analog While Everyone Was Watching Digital"
- "Interesting fact: There is more analog in a digital handset than in an analog one"

Source:

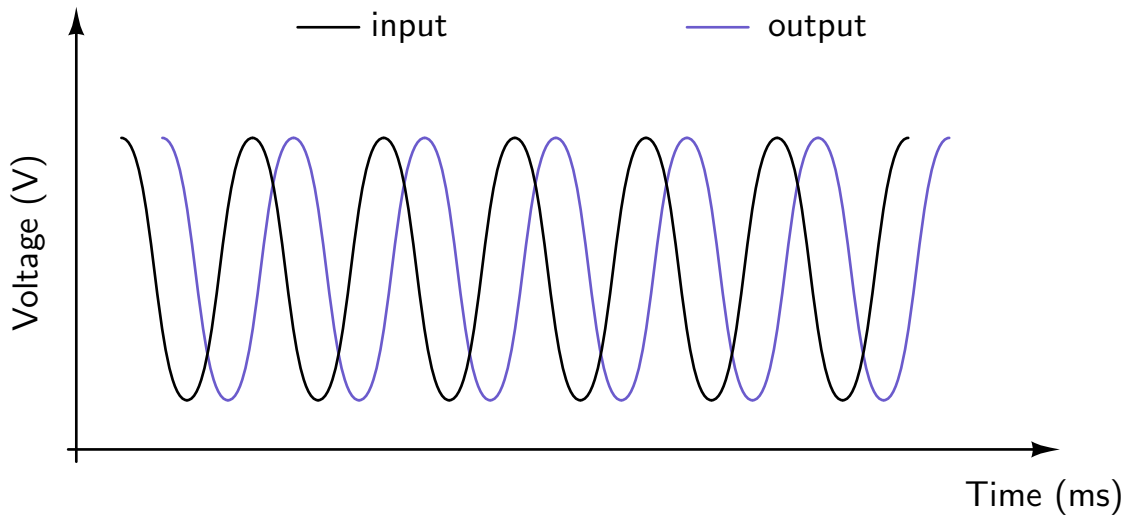
http://www.ee.columbia.edu/~kinget/why_analog.html

# Notation




$$V_{in} = V_{IN} + v_{in} \sin(\omega t + \theta)$$

# Identify the operation of the circuit



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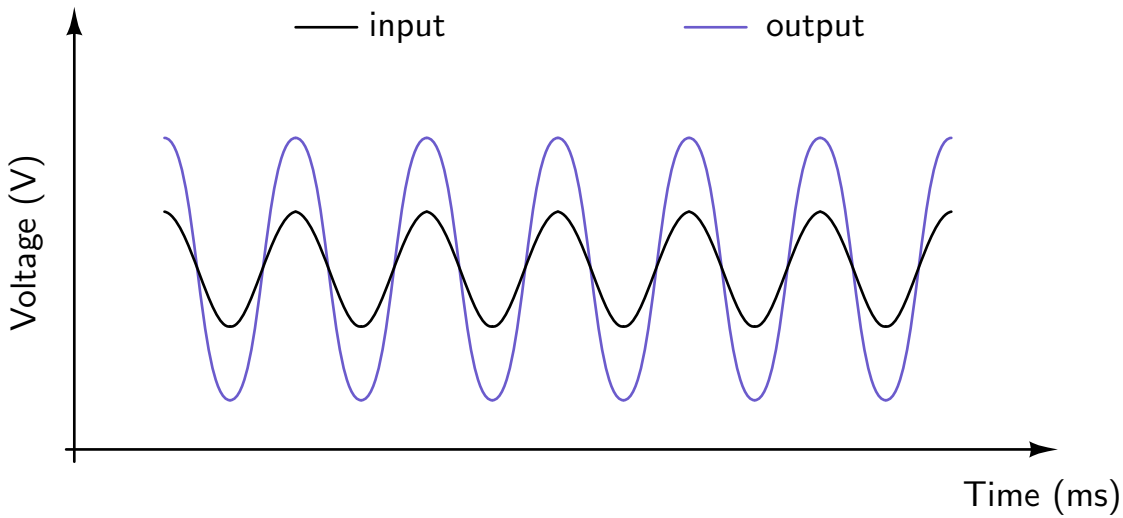

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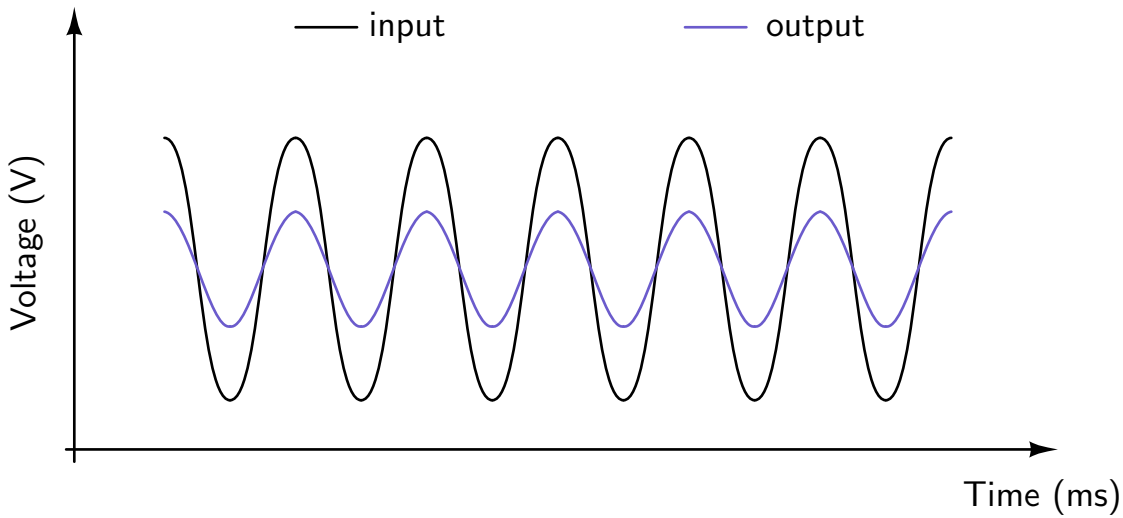

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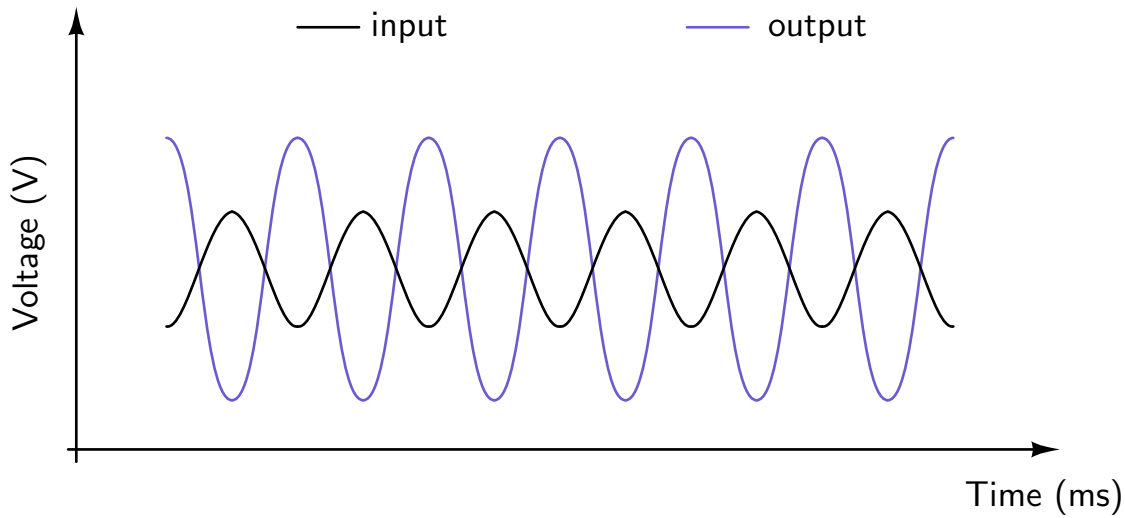

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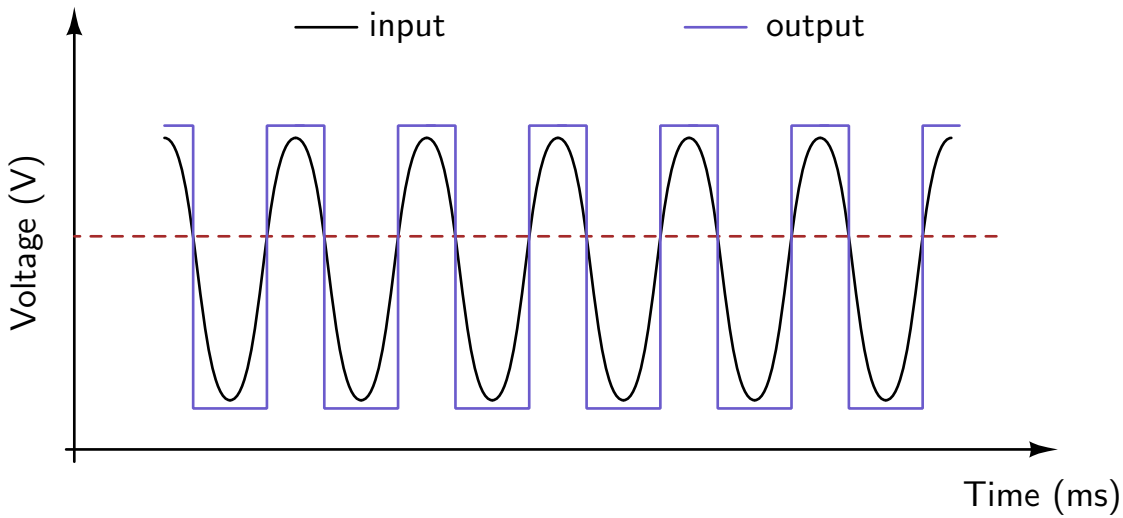

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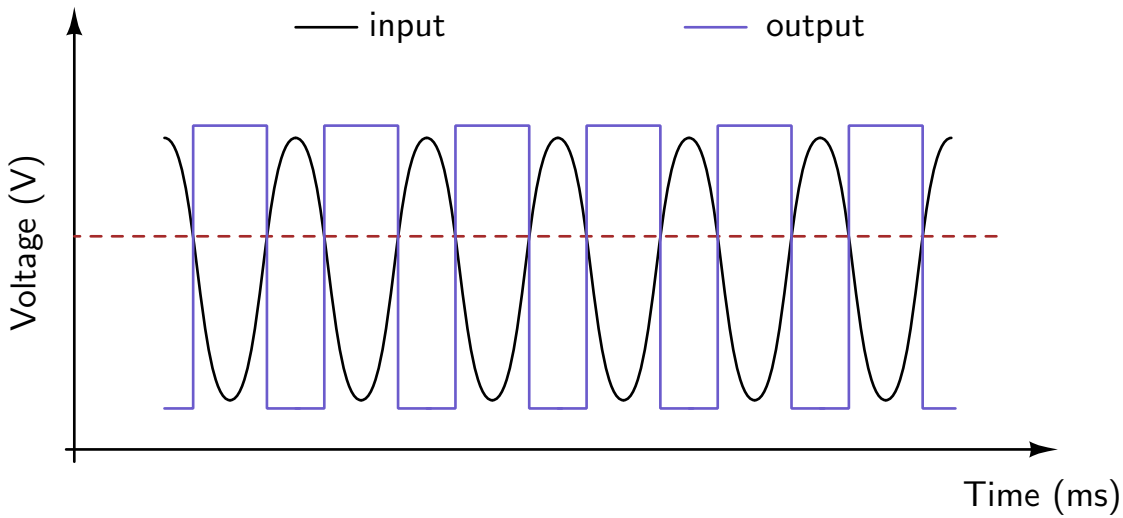

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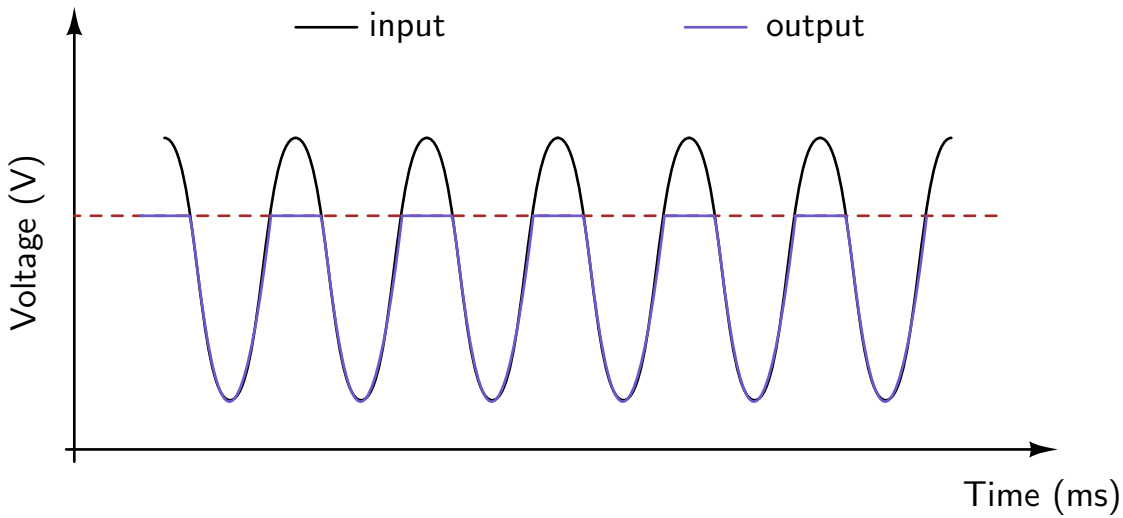

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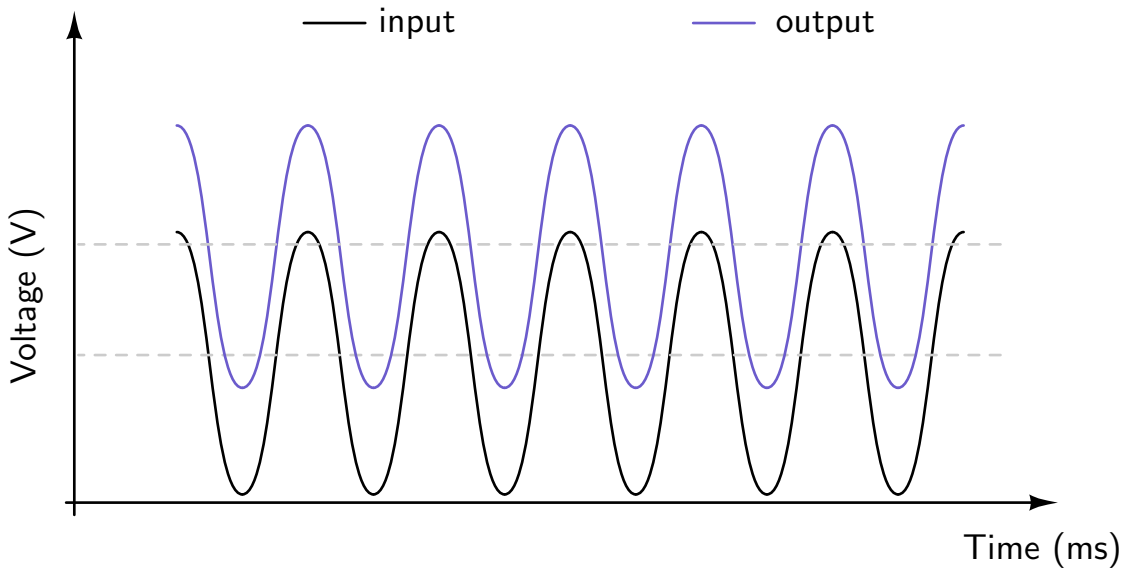

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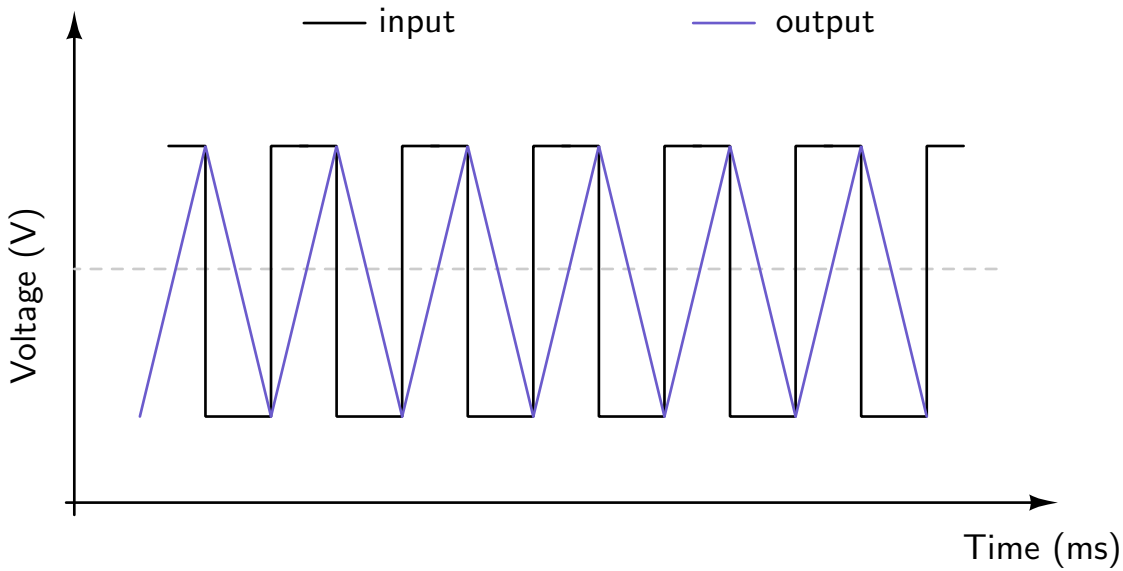

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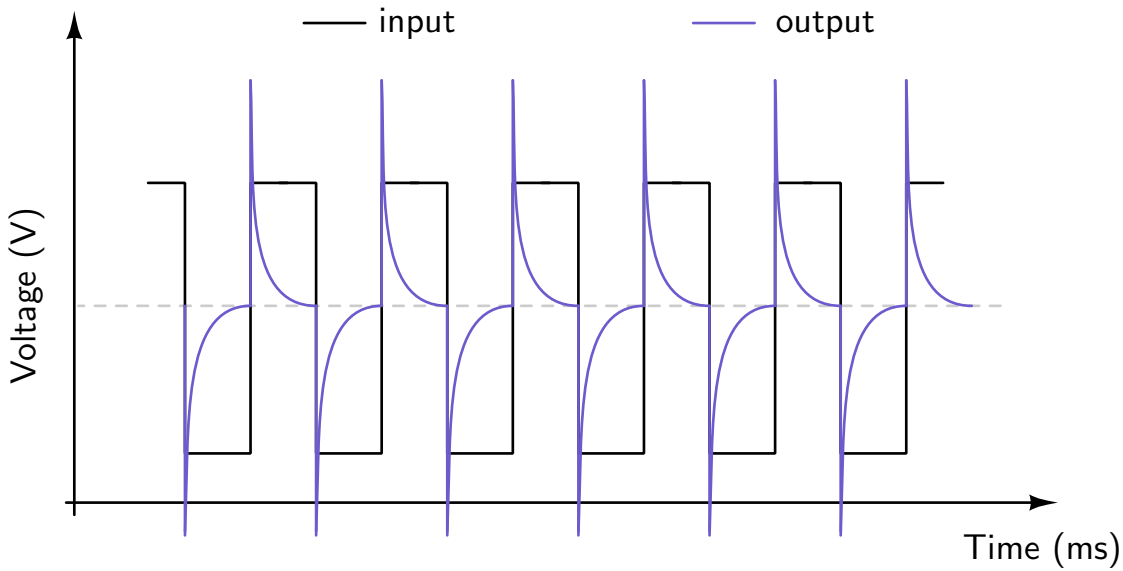

# Summary

- Signals: Analog, Discrete, and Digital
- Notation: $V_{in}(t) = V_{IN} + v_{in}(t)$
- Signals: Variables or operands
- Circuits: Operators
- Circuits: What is the (transfer) function from input to output?

# Reference Book

[1] A. Sedra and K. C. Smith, "Microelectronic Circuits," 6th Ed., Oxford university press, 2011.