# Digital Signal Processing
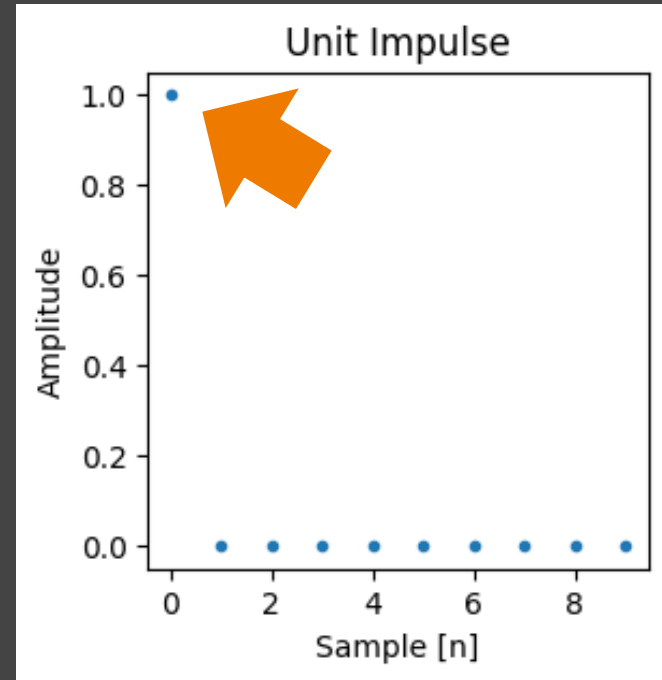
ewout bergsma.

# Last Time: LTI Systems

- LTI Systems
  - 3 properties
  - Do you remember them?

# Last Time: Discrete Time Unit Impulse

$$\delta[n] = \begin{cases} 1, & n = 0 \\ 0, & n \neq 0 \end{cases}$$

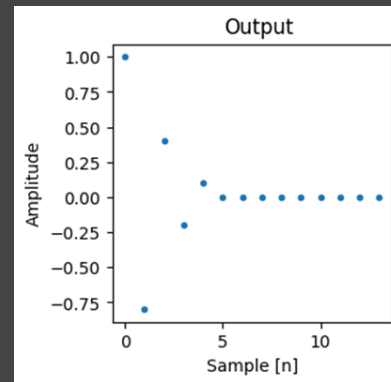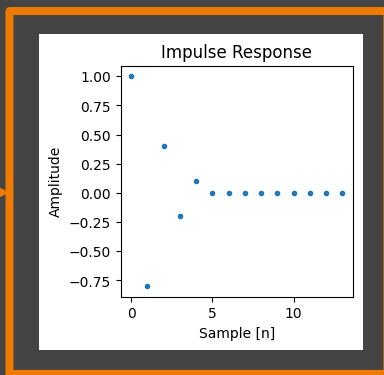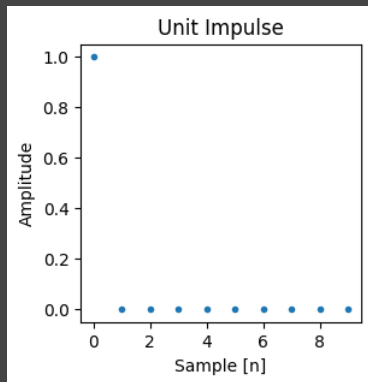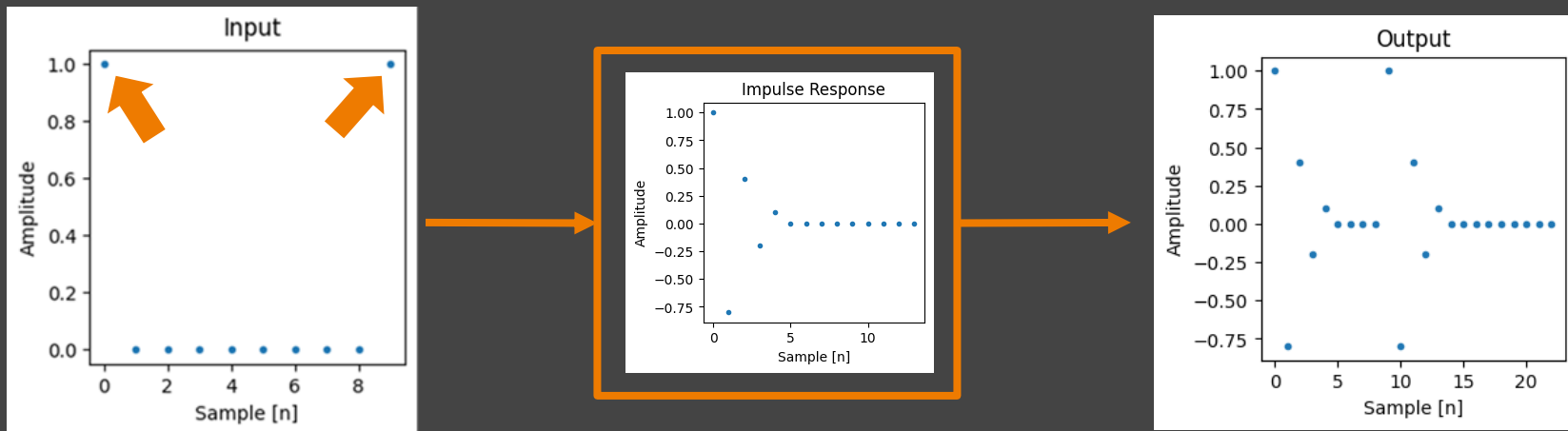# Last Time: Discrete Time Impulse Response

# Questions?

# Convolution

share your talent.
move the world.

ewout bergsma.

# Simple!

# … Steady …

# Excuse me?!

# Convolution!


Input


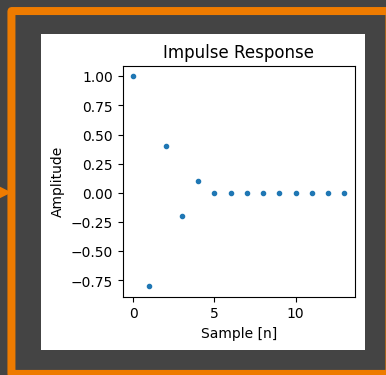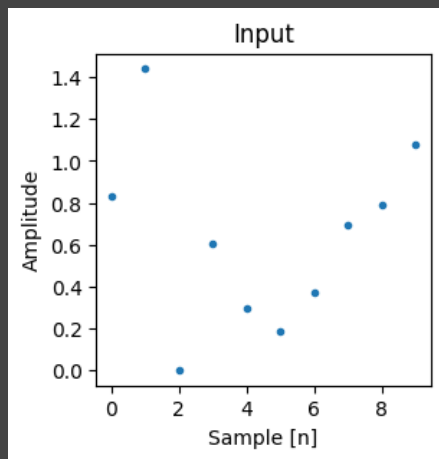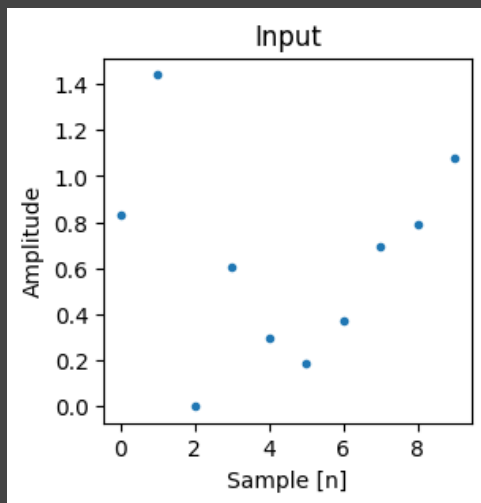Impulse Response


Output
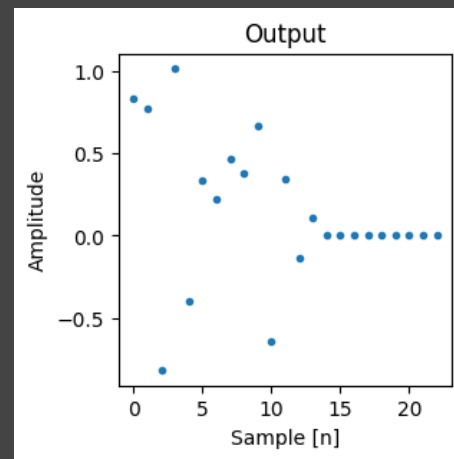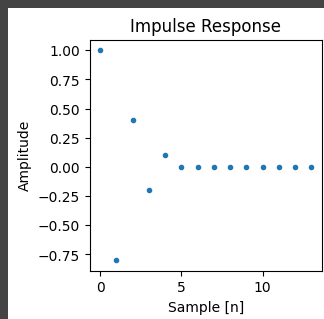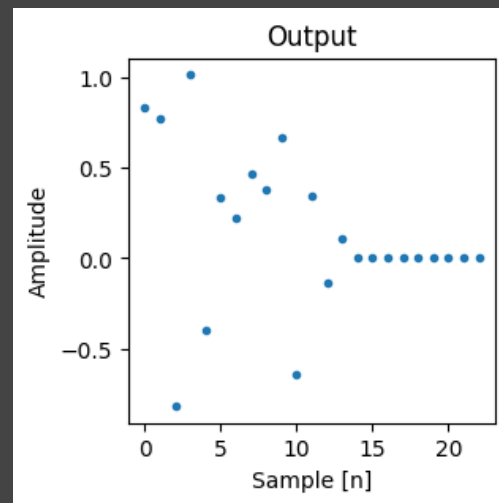
$$x[n] * h[n] = y[n]$$

# Convolution?

# Convolution

$$x[n] * h[n] = \sum_{k=-\infty}^{\infty} x[k]h[n-k]$$

Snippets of video have been removed due to copyright.
Please refer to the link below, it has everything and more than what was in the slides during class.

$$x[n] * h[n] = \sum_{k=-\infty}^{\infty} x[k]h[n-k]$$

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$$x[n] * h[n] = \sum_{k=-\infty}^{\infty} \boxed{x[k]h[n-k]}$$

$$x[n] * h[n] = \sum_{k=-\infty}^{\infty} x[k]h[n-k]$$

# Continuous Time Convolution

$$x(t) * h(t) = \int_{-\infty}^{\infty} x(\tau)h(x - \tau)\, d\tau$$

$$x[n] * h[n] = \sum_{k=-\infty}^{\infty} x[k]h[n - k]$$

# Exercises!