

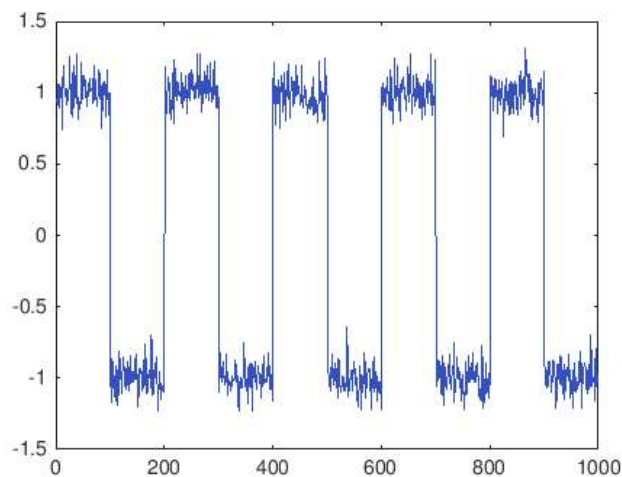
1130-EMARO-MSA-1004# Signal Processing

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T3: Convolution

Task 1

Generate a rectangular signal **A** with 1000 samples and a period of 200 samples, with an amplitude of $\{-1, +1\}$. Add Gaussian noise with 0 mean and 0.1 sigma.



Task 2

Create three simple filters with a size of $[1 \times 3]$:

- **F1** - averaging filter $[1/3 \ 1/3 \ 1/3]$
- **F2** - Gaussian filter $[1/4 \ 1/2 \ 1/4]$
- **F3** - edge-detecting filter $[-1 \ 0 \ 1]$

Convolve input signal **A** with each of the filters. What are the results? What is the goal of each type of filter? Expand filters to a bigger size (e.g. 5×1) and apply to signal **A**. Remember to normalize the filter (when applicable). What happens, if filters are not normalized? What is the difference in result between 3 and 5 element filters? Use function `.conv`

Task 3

Implement your own convolution function using the equation from the lecture. Compare your results with those obtained in task 2.