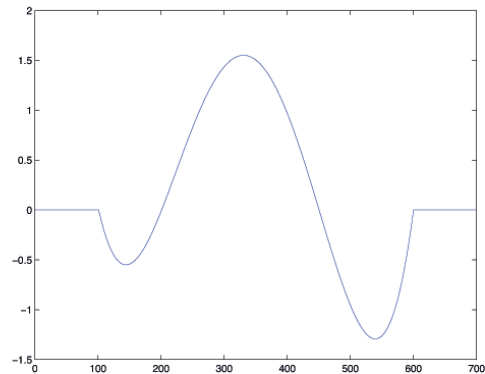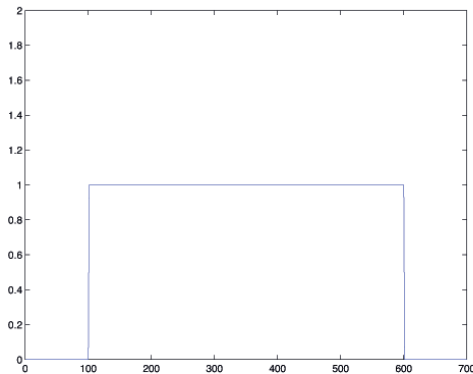# INVERSIO-ONGELMIEN LASKENNALLINEN PERUSKURSSI 2012

MATLAB-HARJOITUS 4

(1) Construct 500 points long signal
   (a) $u_i = 1$, $i = 1 \ldots 500$;
   (b) $s_i = 100 * x_i * (x_i - 1) * (x_i - 0.2) * (x_i - 0.7)$, $x_i = (i-1)/499$, $i = 1 \ldots 500$,
   and pad them from left and right with 100 poins of zeros.

(2) Familiarize yourself with MATLAB function `conv` and convolve signal s_1 with signal
   (a) 100 point boxcar, i.e.

$$k_i = 1/100, \quad i = 1 \ldots 100,$$

   (b) 100 point Hann window (In MATLAB `hann`).
(3) Familiarize yourself with MATLAB function `convmtx` and construct convolution matrices for signal s_i using kernels from the previous problem. Check that you get the same results.
(4) Solve the deconvolution problem

$$m = Bx,$$

   where m is the convoluted signal, B is the convolution matrix and x is the unknown signal. Check the result. Use convolutions and convolution matrices of the previous problems.
(5) Try to solve the previous problem but with some noise added to the measurement, for example, add Gaussian noise to the measurement:

```
m = m + 0.001 * randn(size(m))
```