1) We have a deterministic signal and an additive noise, as the formula below. Using the MVU estimator, estimate the signal, then print the estimated values and plot the estimated signal.

(HINT: A,B are the actual values,first use them to derive data from the noise-free signal then add white noise and carry out the estimation compare estimated values with the actual values)

$$x(n) = A + Bn + \omega(n).\ n = 0.1 \ldots..N-1$$
$$A = 1$$
$$B = 2$$

2) The deterministic signal x is a polynomial depending on time that is aggregated with a Gaussian noise. Using the MVU estimator for linear model(use the x.mat file for data)

$$x(n) = \sum_{k=0}^{p-1} A_k n^k + \omega(n)$$

- Estimate the signal x
- Determine the estimated coefficient matrix
- Plot the noisy signal and estimated signal

3) Using the MVU estimator for Linear model, estimate the signal below and determine the coefficients.

$$x(n) = A_0 + A_1 \sin(2t) + A_2 e^{-0.5t}$$

$$\begin{cases} T_s = 0.1 \\ A_0 = 1 \\ A_1 = 0.2 \\ A_2 = -1 \end{cases}$$

4) Using the MVUE method and sampling time $t_s = 0.1$, derive data and identify the linear system.

$$G(z) = \frac{0.09603 - 0.2176z^{-1} + 0.2118z^{-2} - 0.1307z^{-3} + 0.0449z^{-4}}{1 - 3.897z^{-1} + 6.537z^{-2} - 5.934z^{-3} + 2.93z^{-4} - 0.6273z^{-5}}$$

- Take the noise as the input of the system, demonstrate the estimated coefficients.
- Using the *"step"* command of matlab software, compare the step response of the estimated system and the actual system.