Return m-file solution only to question 4 before 26.4.2013
Email the solution to : fysp120@gmail.com Subject-line: `FNM exercise1`

1. Get acquainted with Matlab; A tutorial `matlab.pdf` is in

   `https://koppa.jyu.fi/kurssit/116361/materiaalikansio`

   and links to english material in

   `https://koppa.jyu.fi/kurssit/116361/useful-material-in-english`

   Try out the examples `linear_fit.m` and `cubic_spline.m` in materiaalikansio.

2. a) Practise vector and matrix creation using the Matlab operations `eye, rand, ones` and writing them element by element.
   b) Create the following matrices:

   $$A = \begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{pmatrix} \quad B = \begin{pmatrix} -1 & -2 & -3 \\ -4 & -5 & -6 \end{pmatrix} \quad v = \begin{pmatrix} 2 & 2 & 1 \end{pmatrix}$$

   and take a look what the following operations do or why a certain operation cannot be done - some are mathematically ill-defined

   ```
   fliplr(A)    A'     A*B     A.*B     A*B'
   v'           A*v    A*v'    v*v'     v.*v
   ```

3. Please get acquainted with Fourier transform using the `fft_test.m` program introduced in the lectures (m-file on the course material page). Go through the sample functions in the m-file to get an ideas how `fft` and `ifft` function. Try to compute the Fourier coefficients for a sawtooth wave (`sawtooth` command) and for the linear combination $y = -\sin(x) + 2\sin(2x) - 3\sin(3x) + 4\sin(4x) - 5\sin(5x)$.

4. **Return solution m-file to this**:
   Take 50 data points evenly $x \in [0, 5]$ and compute the function

   $$y(x) = 5 + 2x\sin(x) + 4e^{-x}$$

   in these points. Add a random deviation $\in [-0.5, 0.5]$ to values y . Find least square fit to the data y using functions $\{1, x\sin(x), e^{-x}\}$ and Matlab's backslash (\) operation and draw in the same figure data y and the fit curve.