Signals & Systems

Laboratory no. 1 – Basics of Matlab

Exercise 1.

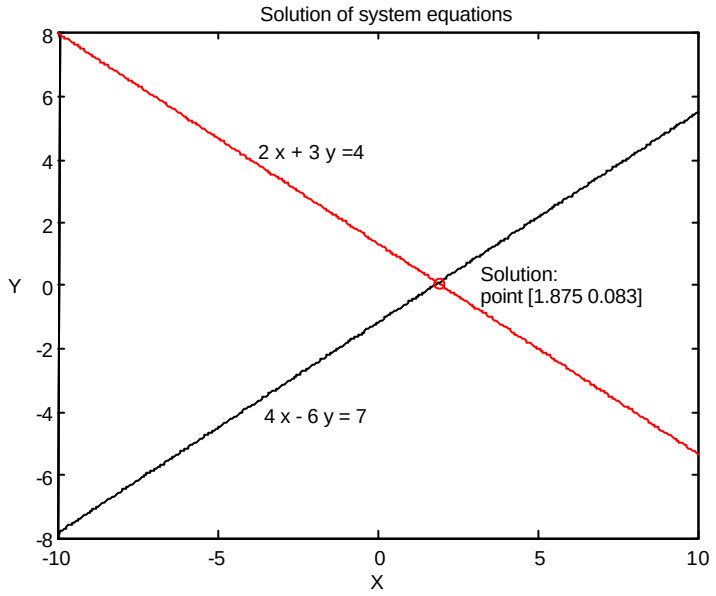
Consider the system of equations:

$$\begin{cases} 2 \cdot x + 3 \cdot y = 4 \\ 4 \cdot x - 6 \cdot y = 7 \end{cases}$$

a). Solve the given system of equations numerically.
Hint: Define the system in the matrix form - A X = b

b). Solve the given system of equations graphically.

- Plot both variables (first with red, second with black color)
- Mark the crossing point with the 'o' marker
- Add descriptions to the figure (example below)



Exercise 2.

Consider the equation:

$$y = \sum_{i=1}^{5} \frac{1}{i} \cdot \sin(2 \cdot \pi \cdot i \cdot t)$$

a). Draw a graph of the function:
Assumptions:

- *t* varies from 0 to 4 sec
- d*t* = 1/500 sec
- color of the line – dark green

b). Add descriptions to the figure:

- Title – „The sum of five sinusoids”
- Label of the x axis – Time [sec]
- Label of the y axis – y(t)

Exercise 3.

For the given equation :

$$z = 40 \cdot x^4 + x - y^4 + 20 \cdot y - 3$$

a). Draw the 3D plot of the function:
Assumptions:

- *x* varies from -2 to 2
- *y* varies from -5 to 5
- step = 1/10

b). Add descriptions to the figure:

- title – Graph of the function $z = 40x^4 + x - y^4 + 20y - 3$
- Label of the x axis – X - axis
- Label of the y axis – Y - axis
- Label of the z axis – Z – axis

Exercise 4.

In the SIMULINK toolbox generate the signals that enables to draw Lissajous curves. Results of the simulation should be presented with use of the *XY Graph* block (*Sinks* library). Next export signals to the Matlab workspace and draw the curves again (add grid, axes labels, title). Export the figure to the *jpg* file (use *save* command)