Laboratory work 1
FREQUENCY ANALYSIS OF SIGNALS USING MATLAB
Preliminary questions

Return the answers in written form to an assistant in the beginning of the work. **Take a copy from the answers to your group.** Write down group members' names and student numbers, group number and date.

1. Answer briefly, what the following concepts mean in context of signals? Give one example of each concept in practice.

Discrete time signal	Quantization	Deterministic
Stokastic	DFT	dBm

2. When particularly is it better to examine the signal regarding to time, x(t), and when regarding to frequency X(f)? Give at least one example of both possibilities. You may also use pictures.

3. The following frequency components were measured in a system of 50 ohm in a single side spectrum (frequency) analysis

Frequency/Hz	Level/dBm	Frequency/Hz	Level/dBm
200	+13	1400	-21
600	-6	1800	-25
1000	-15		

a) Transform the dBm-value of each spectrum component into both efficient and peak value of the voltage. 0 dBm means a power of one milliwatt to a load (systems nominal impedance). Spectrum components can be interpreted as cosine waves and we get peak value = $\sqrt{2}$ x efficient voltage.
b) Form a mathematical formula for a voltage signal x(t) from the calculated results based on the peak values and frequencies of the cosine waves. Phase difference for all cosine waves is 0 radians.
c) Draw a single-side peak value spectrum (frequency domain representation) X(t) for the signal x(t) based on the values in the table and your calculations. Choose appropriate values for the scales and name them so that the results are easy to interpret. Using a logarithmic scale is allowed! Name the figure, too.

4.

a) What is the difference between DFT and FFT? Why isn't DFT used in the computers until these days?