**Practical session 1**

1. Determine the fundamental period of the following discrete-time signal:



2. Determine the fundamental period of the discrete time sinusoids with the following frequencies:





3. Classify the following discrete-time signals as energy or power signals. If the signal is of energy type, find its energy. Otherwise, find the average power of the signal.

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,

where  is unit sample signal,  is unit step signal.

4. Determine the energy and power of the unit step signal

5. Determine the cross-correlation for  for the following WSS discrete-time signals:

, ,

where  is the time shift (or lag).

6. Estimate the frequency resolution of the following PSD estimation:

the sampling frequency of a discrete time signal is 200 Hz and the number of samples are: a) 20; b) 200; c) 2000

7. Verify the resolution condition for resolving two discrete sin signals with central frequencies 15 Hz and 16 Hz and frequency resolutions from Task 6.

8. The sampling frequency of a discrete time signal is 200 Hz and the number of samples are 2000. Estimate the frequency resolutions for using the Bartlett method with division by K segments: a) K=2 b) K=4 c) K=8

9. Describe the main steps of the Welch method