BIRZEIT UNIVERSITY

Electrical and computer engineering

Digital Signal Processing (DSP)

Assignment No (1)

Submission deadline: **Tuesday 18/10/2016** only through Moodle (itc.birzeit.edu)

Question 1:

Consider the following sequences:

$x[n] = \{-4, 5, 1, -2, -3, 0, 2\}, \quad -3 \le n \le 3$

$y[n] = \{6, -3, -1, 0, 8, 7, -2\}, \quad -1 \le n \le 5$

$w[n] = \{3, 2, 2, -1, 0, -2, 5\}, \quad 2 \le n \le 8$

The sample values of each of the above sequences outside the ranges specified are all zeros. Generate and plot (using Matlab function stem()) the following sequences:

a) x[-n+2] b) w[-n] c) x[n] +y[n-2] d) x[n] . w[n+4] e) 3.5y[n]

Question 2:

Determine the fundamental period of the sinusoidal sequence x[n] A $\sin(\omega_0 n)$ for the following values of the angular frequency ω_0

a) 0.6π **b) 0.28π** **c) 0.45π** **d) 0.55π** **e) 0.65π**

Question 3:

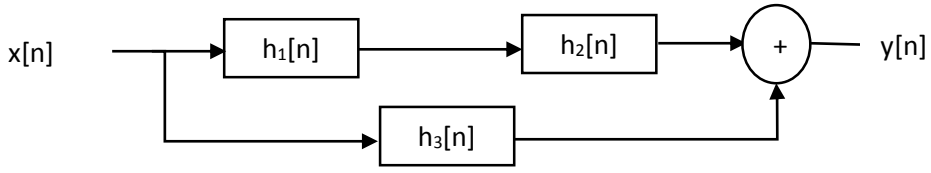
The second derivative y[n] of a sequence x[n] at time instant n is usually approximated by

$$y[n] = x[n+1] - 2x[n] + x[n-1]$$

if y[n] and x[n] denotes the output and input of a discrete-time system, is the system linear? Is it time-invariant? Is it causal?

Question 4:

Determine the overall impulse response of the following system, where the impulse response of the component systems are: h1[n] = 2δ[n-2] -3δ[n+1], h2[n] = δ[n-1] + 2δ[n+2], and h3[n] = 5δ[n-5] +7δ[n-3] +2δ[n-1] – δ[n] + 3δ[n+1].



Question 5:

Use Matlab (or any programming language) for generating a one second discrete-time signal with three frequencies; 500Hz, 1.5KHz and 3.5KHz and sampling frequency Fs=8KHz. Display your signal using stem or plot functions.

Design and implement a moving average DSP system with a configurable window size. Tune filter window size so the cutoff frequency is equivalent to 2KH. Pass your signal (generated above) through this filter to get output signal. Display output signal and compare it with your input signal? Explain differences?