ITU Computer and Informatics Faculty

BLG 354E Signals and Systems for Computer Engineering -2020 Spring

Homework-1

Due 06.04.2020 23:59

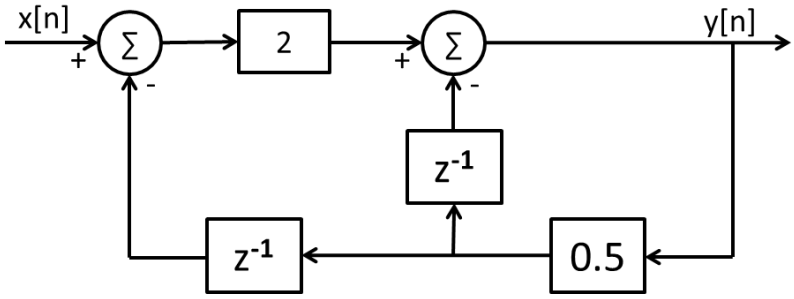
- No late submissions will be accepted.
- In Case of Cheating and Plagiarism Strong disciplinary action will be taken.
- You are asked to upload .py files and .pdf file (report) in your zip file. Give a brief explanation of your code in your report.
- Use comment outs on the necessary lines in your code.
- Put your name and number at the top of your code.
- The code you typed must WORK (as the manner of syntax). Otherwise, you will get zero points for that homework. Your code will not be fixed or debugged to work.

1- Consider the discrete system shown in the figure below where x[n] is the input and y[n] is the output.

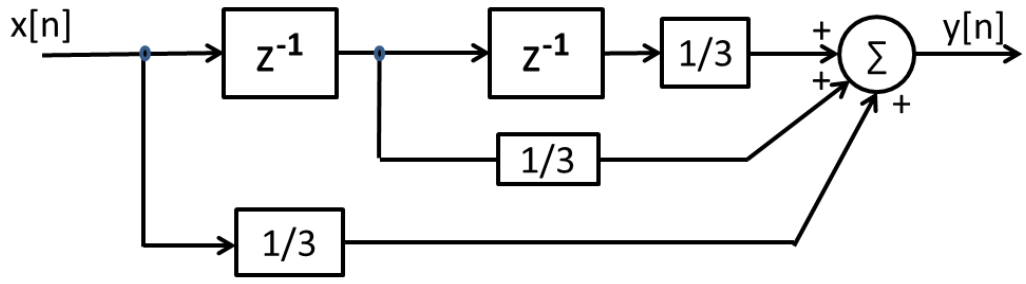
a) Find the impulse response (h[n]) of the system.

b) Find and draw the system output values for n=0 to 5 while input stream x[n] is:

x[n]=u[n]-u[n-2]+2·δ[n-1]



2- Block diagram of a moving average type FIR Filter is shown in the below figure.



a) Express the output y[k] as a function of x[k] in a difference equation and the transfer function $T(z) = \frac{Y(z)}{X(z)}$

b) Draw the step response in time domain for 5ms where sampling time T_s=1ms

c) Write a Pseudo code for implementation of this filter

3- Apple Stock Price (@Nasdaq AAPL) is given in the attached .csv file. Write a Python program that performs the following tasks:

a) Draws the variation of the closing price in chosen date interval (default will be all data)

b) Draws 2nd order-3 tap moving average FIR filtered closing price value (as given in the previous question) in chosen date interval when a logical option is checked

c) Calculates “Average”, “Standard deviation” and “Root Mean Square” values of the drawn graphics