

Homework 3

Submission Deadline: March 10, 2017

Instructions:

- i) Submit on Blackboard before the mentioned deadline.**
- ii) No collaboration is allowed for any problems.**
- iii) The points allotted for each problem is noted alongside.**
- iv) You can use any software to draw the graphs.**
- v) For MATLAB problems, submit both code as well as required figure on Blackboard.**

1. Chapter 11 Problem 41 (c) (10 points)

2. Consider a DT filter with impulse response (20 points)

$$h[n] = 0.9^n u[n]$$

A DT signal $x[n] = 3 \cos\left(\frac{2\pi n}{14}\right)$ is provided as input the filter.

Find the output of filter **WITHOUT** using the convolution formula.

Hint: See Example 11.7 in the book.

3. Chapter 11 Problem 43 (b) (20 points)

Hint: This is DF II form (See Figure 9.3 in book) of system realization.

Using the coefficients, you can get the transfer function in the form of equation 9.3.

Now substitute z with $e^{j\Omega}$ and you'll get the magnitude response.

Using MATLAB or any appropriate software plot the magnitude and phase responses.

Alternatively, you can directly trace the figure in question to define a relation between input and output.

MATLAB Problems

4. Solve Problem 2 above using MATLAB.

Use MATLAB's fft function to obtain the frequency response of the filter.

Your submission figures should include

- i) The magnitude of the filter. (10 points)
- ii) The phase response of the filter (5 points)
- iii) The input signal. (5 points)
- iv) The output signal. (5 points)

You cannot use MATLAB's convolution function to solve this problem.