

ECE 113 Digital Signal Processing

Quiz 4 - Part 2

Note:

- Full credit will not be given if all work is not clearly shown
- Submit the written solutions on Gradescope by May 23, 2020 5 pm

1. Consider two sequences $x[n]$ and $h[n]$ of length 4 given by

$$x[n] = \cos\left(\frac{\pi}{2}n\right) \quad n = 0, 1, 2, 3$$

$$h[n] = \left(\frac{1}{2}\right)^n \quad n = 0, 1, 2, 3$$

- a) Calculate $y[n] = x[n] \otimes h[n]$ by doing the circular convolution directly. Also plot the shifted $h[n-i]_{\text{mod } 4}$ for $n=0, 1, 2, 3$.
- b) Calculate $y[n]$ by using the 4-point DFT.

2. Show that

$$x[n] = \text{IDFT}\{X[k]\} = \frac{1}{N} [\text{DFT}\{X^*[k]\}]^*$$

Where $*$ denotes the complex conjugate and $X[k] = \text{DFT}\{x[n]\}$