Homework 10

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Name : TRAN, Thanh Cong

Student ID: 2 2 1 0 4 2 1

10.1) $x[n] = \{0, 1, 2, 1\}$

* $X(e^{jw}) = \sum_{n=-\infty}^{+\infty} x[n]\, e^{-jwn}$

$= e^{-jw} + 2e^{-j2w} + e^{-j3w}$

Sample $X(e^{jw})$ at $w_k = \frac{2\pi}{4} k$

$X(e^{jw})\Big|_{w=\frac{2\pi}{4}k} = e^{-j\frac{\pi}{2}k} + 2e^{-j\pi k} + e^{-j\frac{3\pi}{2}k}$ (1)

* $\tilde{X}(k) = \sum_{n=0}^{3} x[n]\, e^{-j\frac{2\pi}{4}kn}$

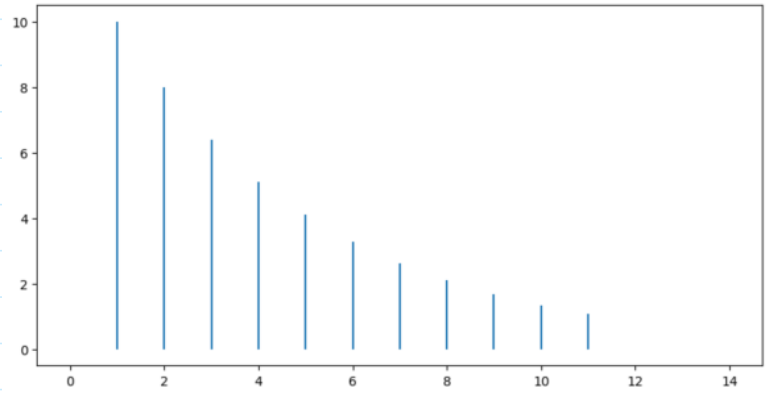
$= e^{-j\frac{\pi}{2}k} + 2e^{-j\pi k} + e^{-j\frac{3\pi}{2}k}$ (2)

(1)(2) $\Leftrightarrow X(e^{jw})\Big|_{w=\frac{2\pi}{4}k} = \tilde{X}(k)$

10.2) $x[n] = 10(0.8)^n$, $0 \le n \le 10$

* $x[n]$: [10. 8. 6.4 5.12 4.096 3.2768 2.62144 2.097152 1.6777216 1.34217728 1.07374182]

* $x((n-1))_{15}$: [0. 10. 8. 6.4 5.12 4.096 3.2768 2.62144 2.097152 1.6777216 1.34217728 1.07374182 0. 0. 0.]



10.3) $x_1[n] = \{1, 2, 2\}$, $x_2[n] = \{1, 2, 3, 4\}$

* $x_1[n]$ (5) $x_2[n]$: [9, 4, 9, 14, 14]

* $x_1[n]$ (6) $x_2[n]$: [1, 4, 9, 14, 14, 8]

* $x_1[n]$ (1) $x_2[n]$: Error because length(x1) > 1