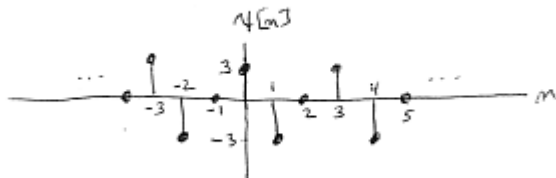


H10-08

1. Compute the discrete-time Fourier series coefficients for the signals below and sketch the magnitude and phase spectra..

(a) $x[n] = 1 + \cos(\pi n / 3)$

(b)



(c)



(d) $x[n] = \sum_{k=-\infty}^{\infty} \delta(n - 4k - 1)$

2. For the sets of DTFS coefficients given below, determine the corresponding real, periodic signal $x[n]$.

(a) $X_k = \begin{cases} 1/2, & k \text{ even} \\ -1/2, & k \text{ odd} \end{cases}, \quad \omega_o = \pi$

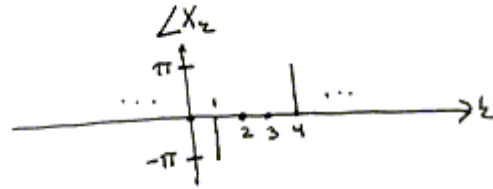
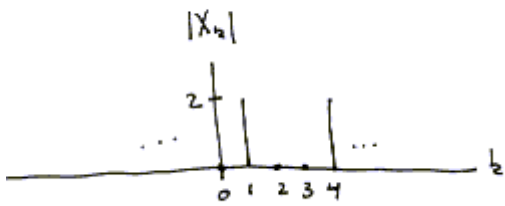
(b) $X_k = 1/2, \quad \text{for all } k, \quad \omega_o = \pi$

(c) $X_0 = -1, X_1 = 0, X_2 = 1, X_3 = -2, X_4 = 1, X_5 = 0, X_{k+6} = X_k, \quad \omega_o = \pi/3$

3. Suppose $x[n]$ is periodic with *even* fundamental period N_o and DTFS coefficients X_k . If $x[n]$ also satisfies $x[n] = -x[n + N_o/2]$, for all n , show that $X_k = 0$ if k is even.

4. Given the fundamental period N_o and the magnitude and phase spectra as shown for a real, discrete-time signal, what is the signal?

(a) $N_o = 5$



5. If $x[n]$ has fundamental period N_o , an even integer, and discrete-time Fourier series coefficients X_k , what are the Fourier series coefficients for

(a) $\hat{x}[n] = x[n + N_o/2]$

(b) $\hat{x}[n] = (-1)^n x[n]$ (Assume that $\hat{N}_o = N_o$ and give an example to show why this assumption is needed.)