

DTFT

1. What is the DTFT of the following finite length sequences? You can use Matlab commands if you write them out explicitly.
 - a. $x_1[n] = [3 \quad 2 \quad 1]$ at $\omega = \pi/2$ rads/ sample
 \uparrow
 - b. $x_2[n] = [3 \quad 2 \quad 3]$ for all ω
 \uparrow
 - c. $x_1[n] = [3 \quad 2 \quad 1]$ at $\omega = 0$ rads/ sample
 \uparrow
2. $x_4[n] = [k \quad -k \quad k \quad -k]$
 - a. Find $X(e^{j0})$
 - b. Find $X(e^{j\frac{\pi}{2}})$
 - c. Find $X(e^{j\pi})$
 - d. A student argues that by inspection all energy in the sequence must be at $\omega = \pi$ rads/ sample since the sequence exhibits the highest frequency oscillation possible in the digital domain.

A second student argues that the DTFT will show all the energy is concentrated at $\omega = \pi + k2\pi$ where k is any integer.

Is either one right?

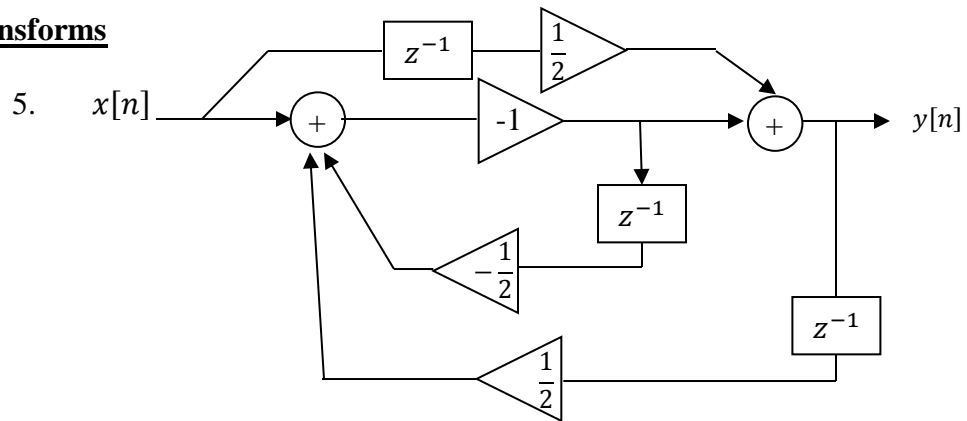
DFT

3. $x[n] = [1 \quad 3 \quad 2 \quad 4 \quad -1 \quad 6]$, and has a DFT of $X[k]$

Which k corresponds to the highest frequency in $x[n]$?

4. Find the DFT of $x_4[n] = [k \quad -k \quad k \quad -k]$.

Z Transforms



- a. Find $H(z)$
- b. For $x[n] = \delta[n]$, find $y[n]$