

## ASSIGNMENT 06: FOUR-YEAR TRANSFORM

Assume for this assignment that we're sampling at 96 kHz.

1. Define your own anonymous `db2mag()` function so that you can easily generate signals at different dB levels.
2. Generate a signal with 192k samples with frequencies at -20.48 kHz, -360 Hz, 996 Hz, and 19.84 kHz at 14 dB, -10 dB, 0 dB, and 2 dB respectively. Next, add -10 dB of white noise with `randn()`. Finally, take the DFT and plot its magnitude on the dB scale.
3. Given the following digital filter:

$$H(z) = 0.53 \frac{(z - (0.76 \pm j0.64))(z - (0.69 \pm j0.71))(z - (0.82 \pm j0.57))}{(z - (0.57 \pm j0.78))(z - (0.85 \pm j0.48))(z - 0.24)(z - 0.64)} \quad (1)$$

Generate a pole-zero plot along with plots for the magnitude and phase response. For the latter two, look at `freqz()`'s documentation to figure out how to get the response of this filter over physical frequencies.

**Aside—**  
Remember that only frequencies up to the Nyquist frequency are of interest to us due to aliasing distortion!