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.

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

3. Given the following digital filter:

$$H(z) = 0.53\frac{(z-(0.76\pm \mathrm{j}0.64))(z-(0.69\pm \mathrm{j}0.71))(z-(0.82\pm \mathrm{j}0.57))}{(z-(0.57\pm \mathrm{j}0.78))(z-(0.85\pm \mathrm{j}0.48))(z-0.24)(z-0.64)} \quad (1)$$

   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.

