Ch6 Fourier

On board, did demonstration to show what convolution looks like for two sin curves of the same vs different frequencies, and of different phases.

Discrete-time filters in continuous frequency space

Back to your textbook, in Chapter 6:

Thus for fixed m and arbitrary n, we have

Gain

$\left|y_{m,n}\right| \leq \left|H\left(-m\omega T_s\right)\right| \left|x_{m,n}\right|$

So we define **gain** or **attenuation** of this transformation as $G(\zeta) = |H(\zeta)|$

. . .

We define **phase rotation** as $\Theta(\zeta) = \theta$, where $H(\zeta) = |H(\zeta)|e^{i\theta}$

. . .

The filter h will **attenuate** the signal at frequencies where $|H(\zeta)| < 1$ and **amplify** the signal at frequencies where $|H(\zeta)| > 1$. It will phase shift the signal by $\Theta(\zeta)$.

High-pass and low-pass filters

The FIR filter $\mathbf{h} = \{h_k\}_{k=0}^{L}$ with discrete time Fourier transform $H(\zeta)$ is a **lowpass filter** if $|H(0)| = 1$ and $|H(\pi)| = 0$; $\mathbf{h}$ is a **highpass filter** if $|H(0)| = 0$ and $|H(\pi)| = 1$.