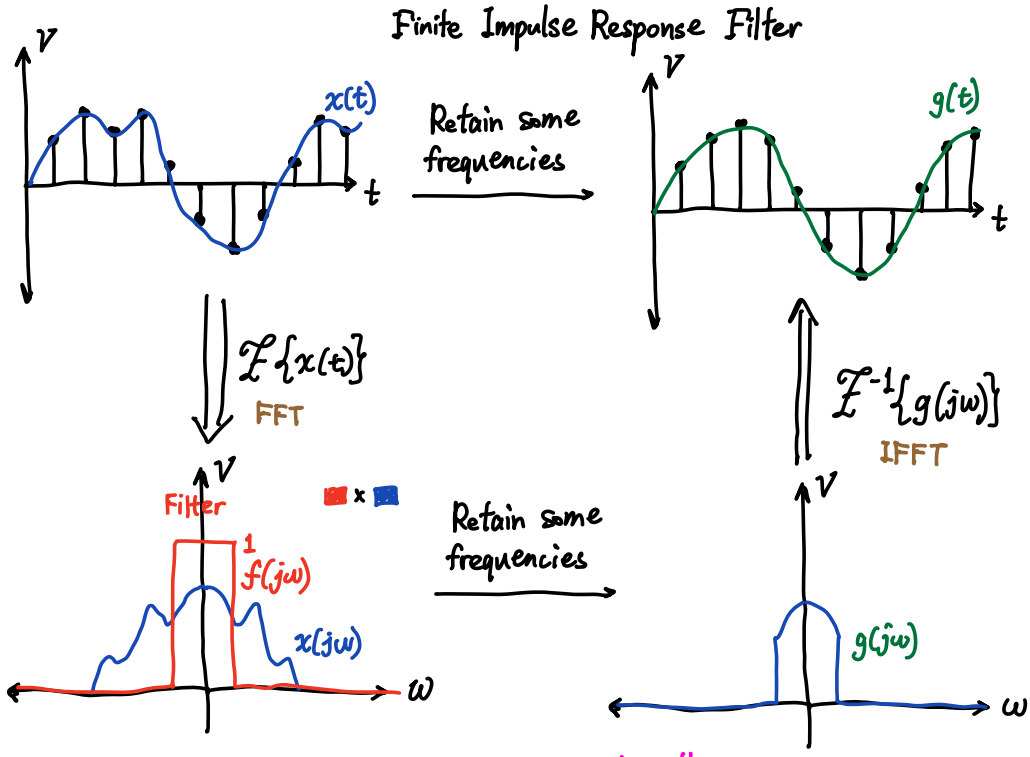
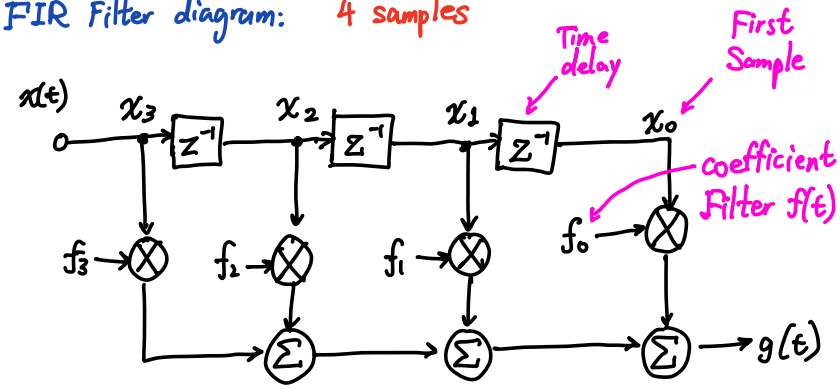
Finite Impulse Response Filter



$x(j\omega)\cdot f(j\omega) = \boxed{x(t) * f(t)}$ FIR filter does this.

FIR Filter diagram: 4 samples



Convolution: Multiplication of one signal by another and the integrating that product.

Because number of f_i is finite, filter can't be ideal. (Trade passband ripple vs. roll off slope)

$$y[n] = \sum_{k=0}^{N} b_k x[n-k] \qquad H(z) = \sum_{k=0}^{N} b_k z^{-k} = b_0 \cdot \prod_{k=1}^{N} (1 - c_k z^{-1})$$

Only pole at $z = 0$.

$$h[n] = \begin{cases} b_n, & 0 \le n \le N \\ 0, & \text{otherwise} \end{cases}$$

Optimize RMSE (This class) or Maximum Error: $H(e^{j\omega}) \Leftrightarrow H_d(e^{j\omega})$ (desired)

FIR can have arbitrary magnitude/phase response, can obtain linear phase.