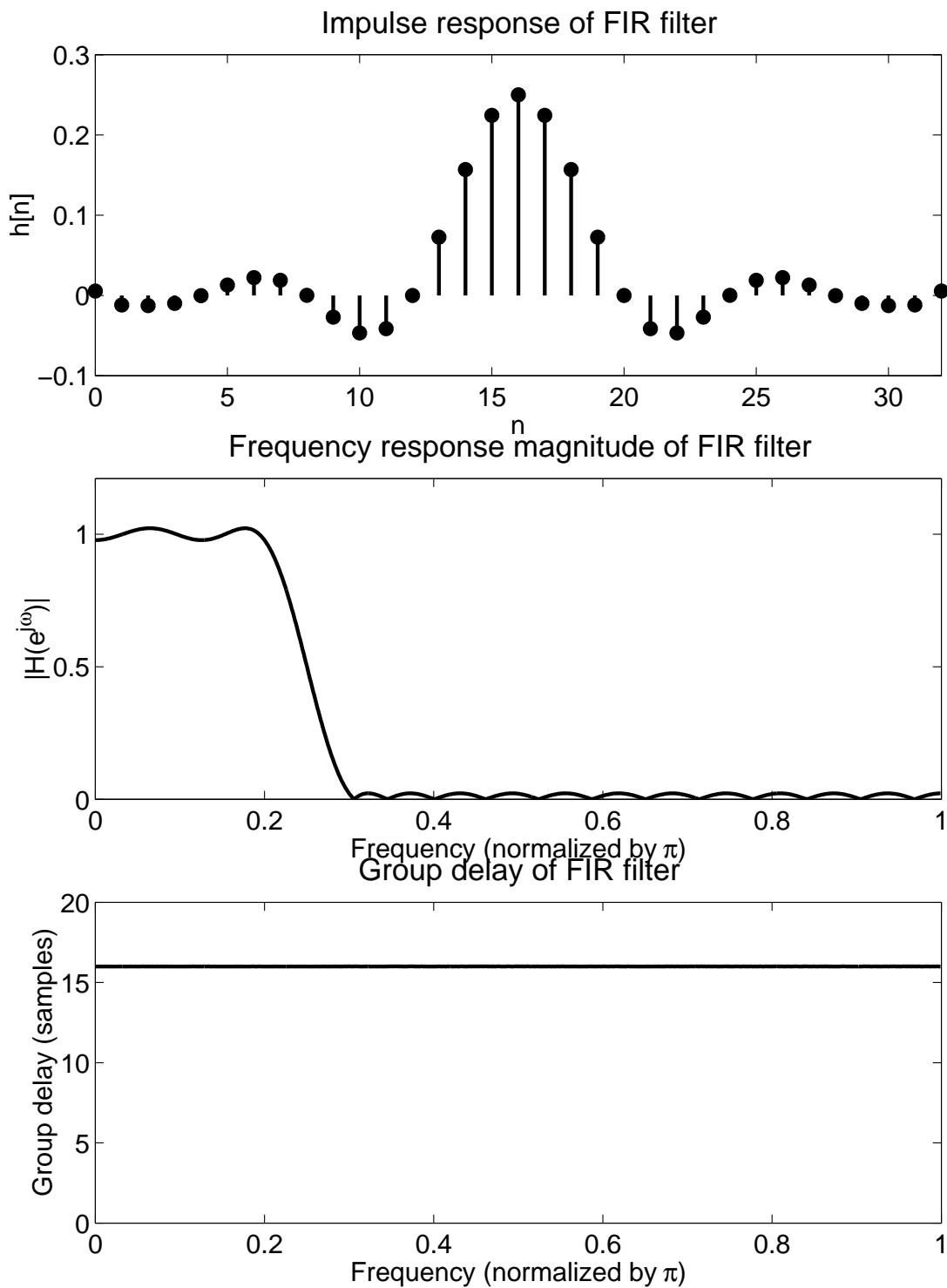
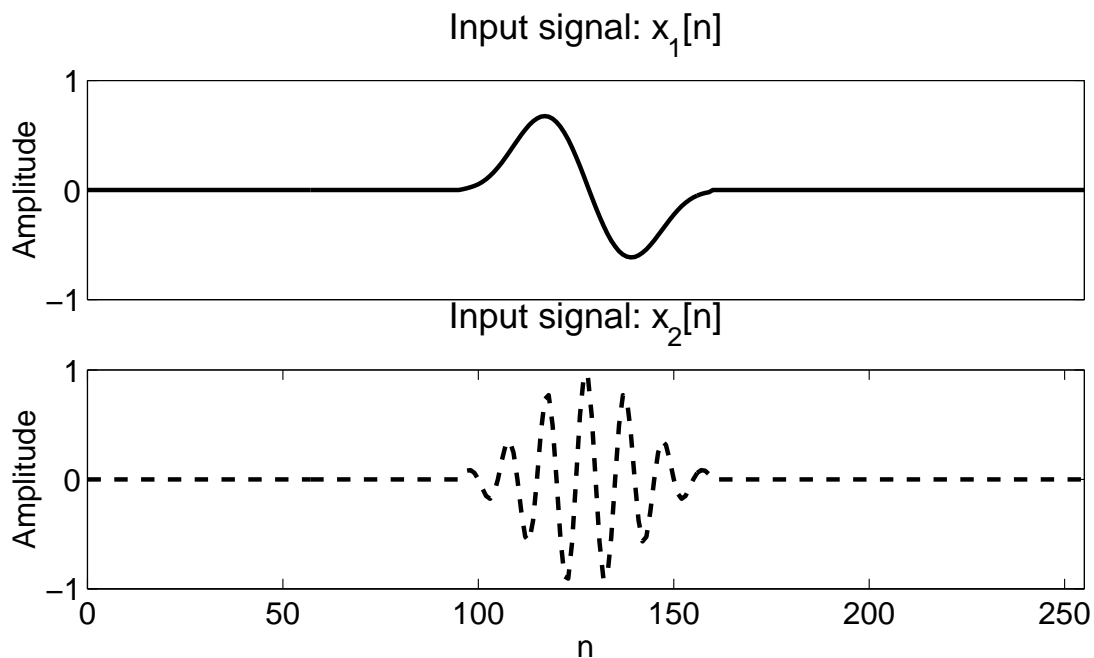


Group delay example: FIR filter characteristics

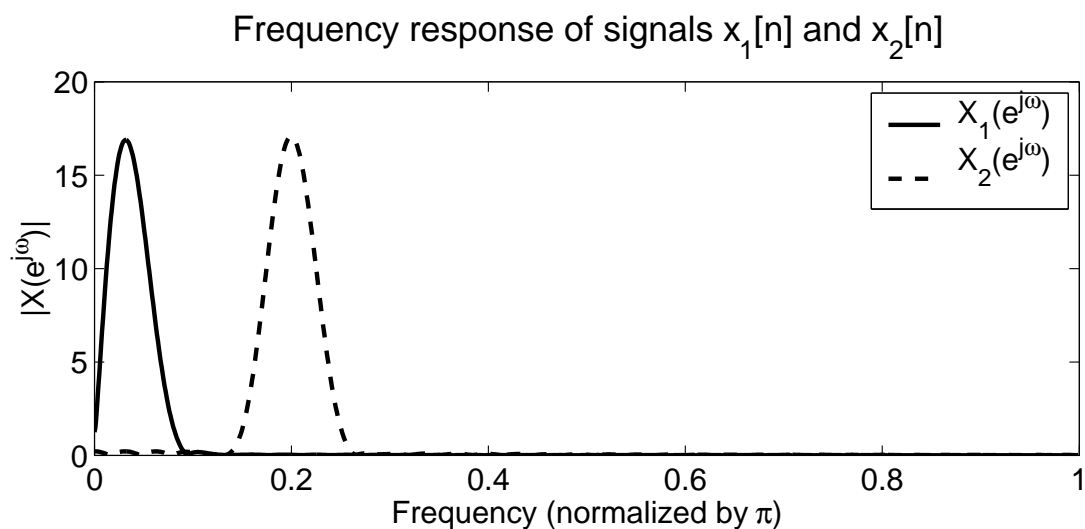


Group delay example: 2 input signals

Consider 2 narrowband pulses, $x_1[n]$ and $x_2[n]$:



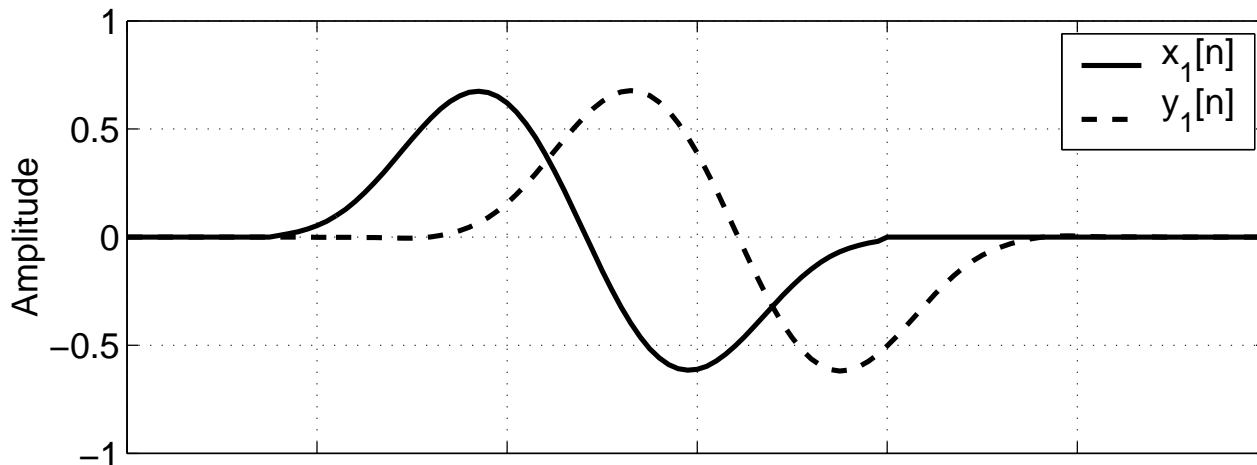
Fourier transform magnitudes, $|X_1(e^{j\omega})|$ and $|X_2(e^{j\omega})|$



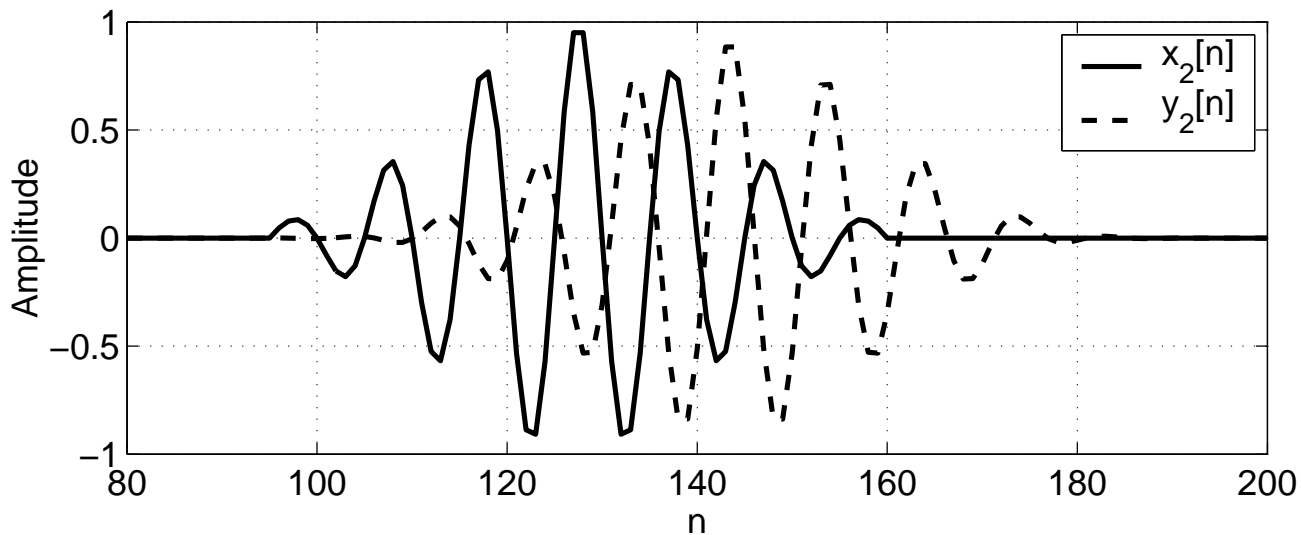
Group delay example: input/output of FIR filter

Compare the inputs/outputs of the FIR filter

FIR filter: Input/Output signals: $x_1[n]$ and $y_1[n]$

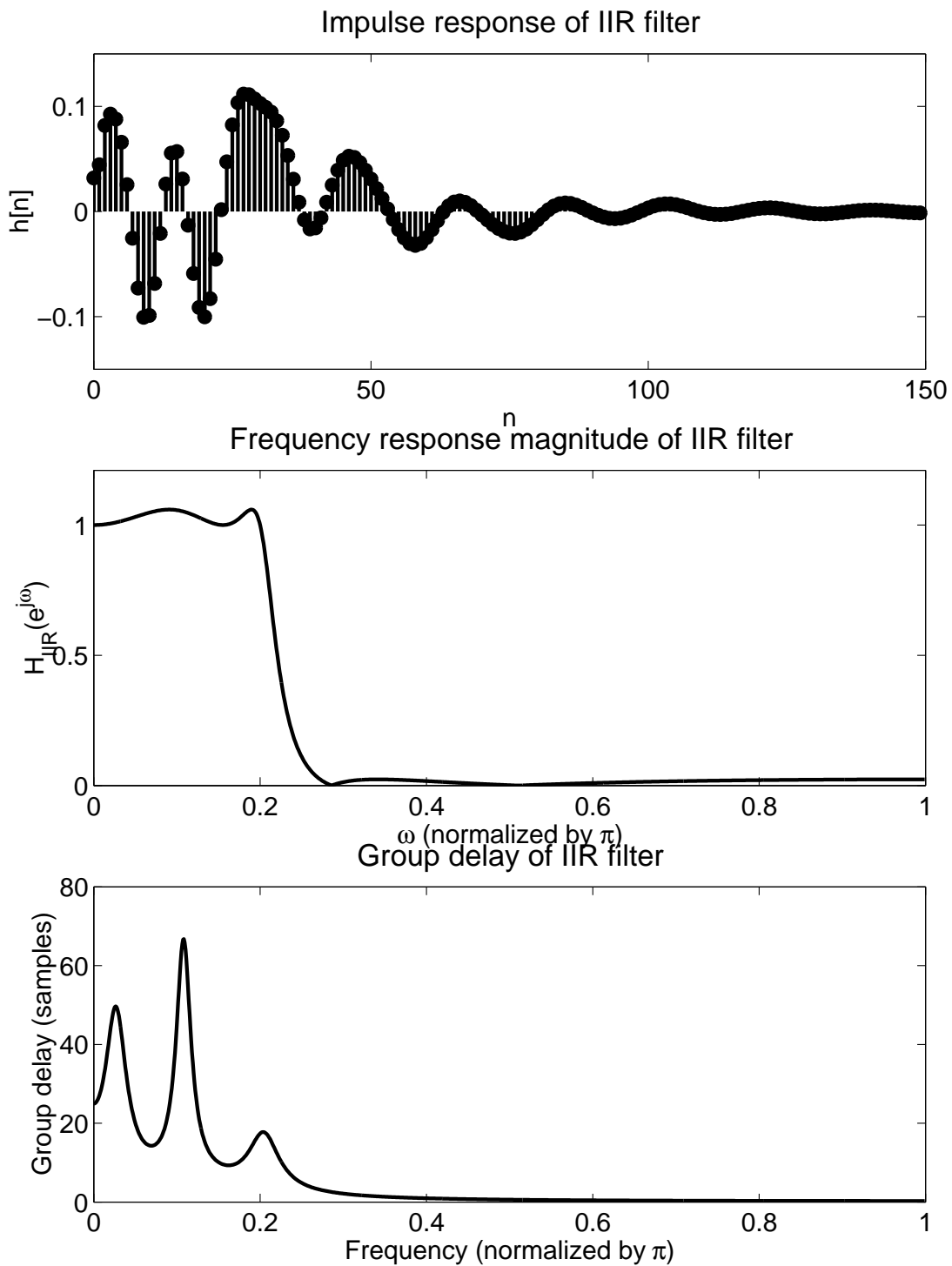


FIR filter: Input/Output signals: $x_2[n]$ and $y_2[n]$



Are the signals delayed by the right amounts?

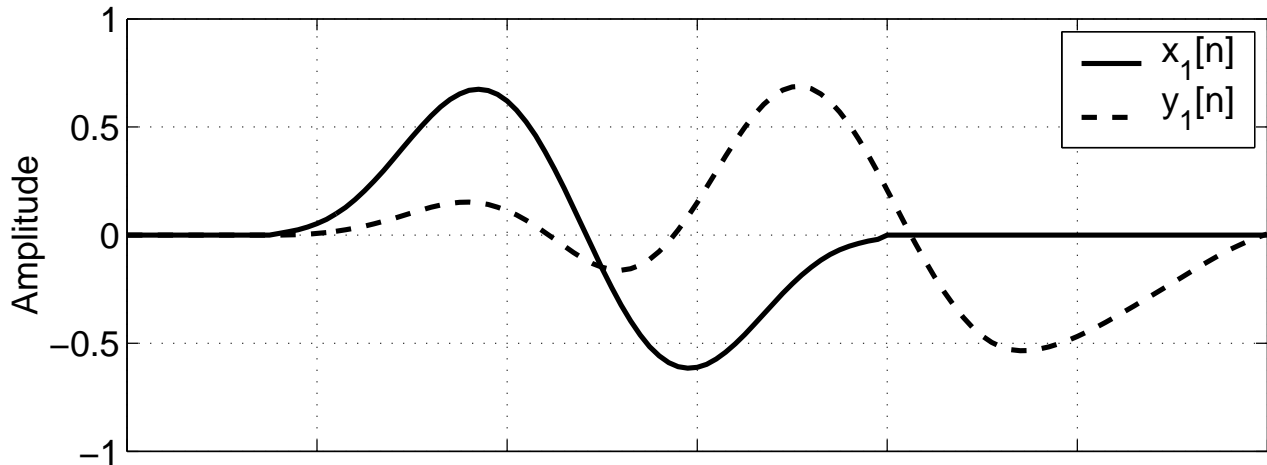
Grp delay example: 8th-order IIR filter characteristics



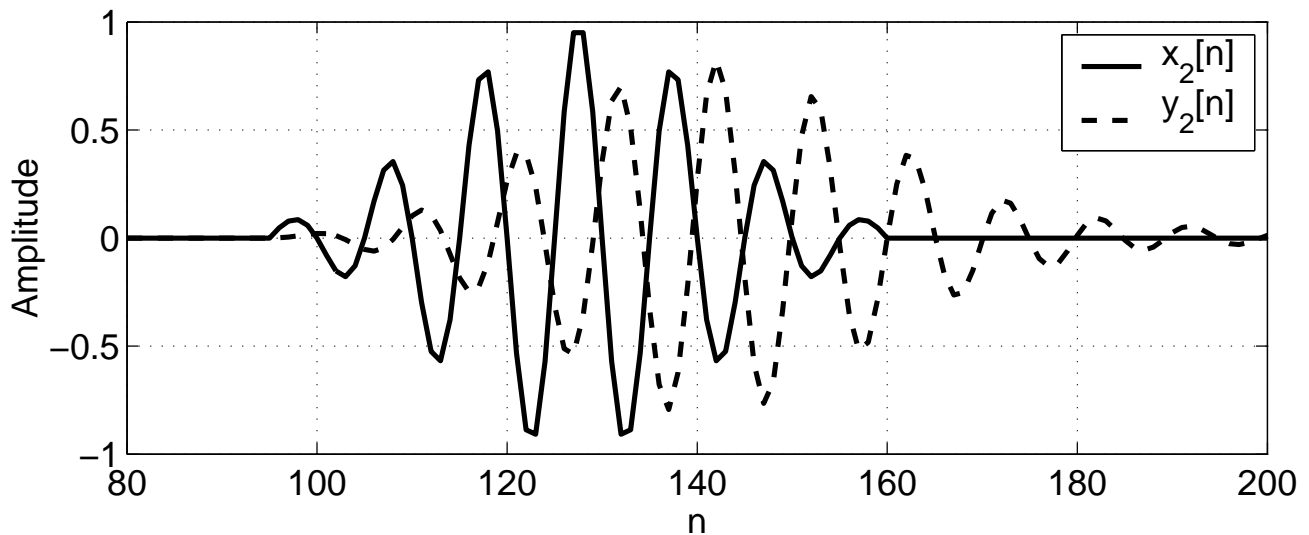
Group delay example: input/output of IIR filter

Compare the inputs/outputs of the IIR filter

IIR filter: Input/Output signals: $x_1[n]$ and $y_1[n]$



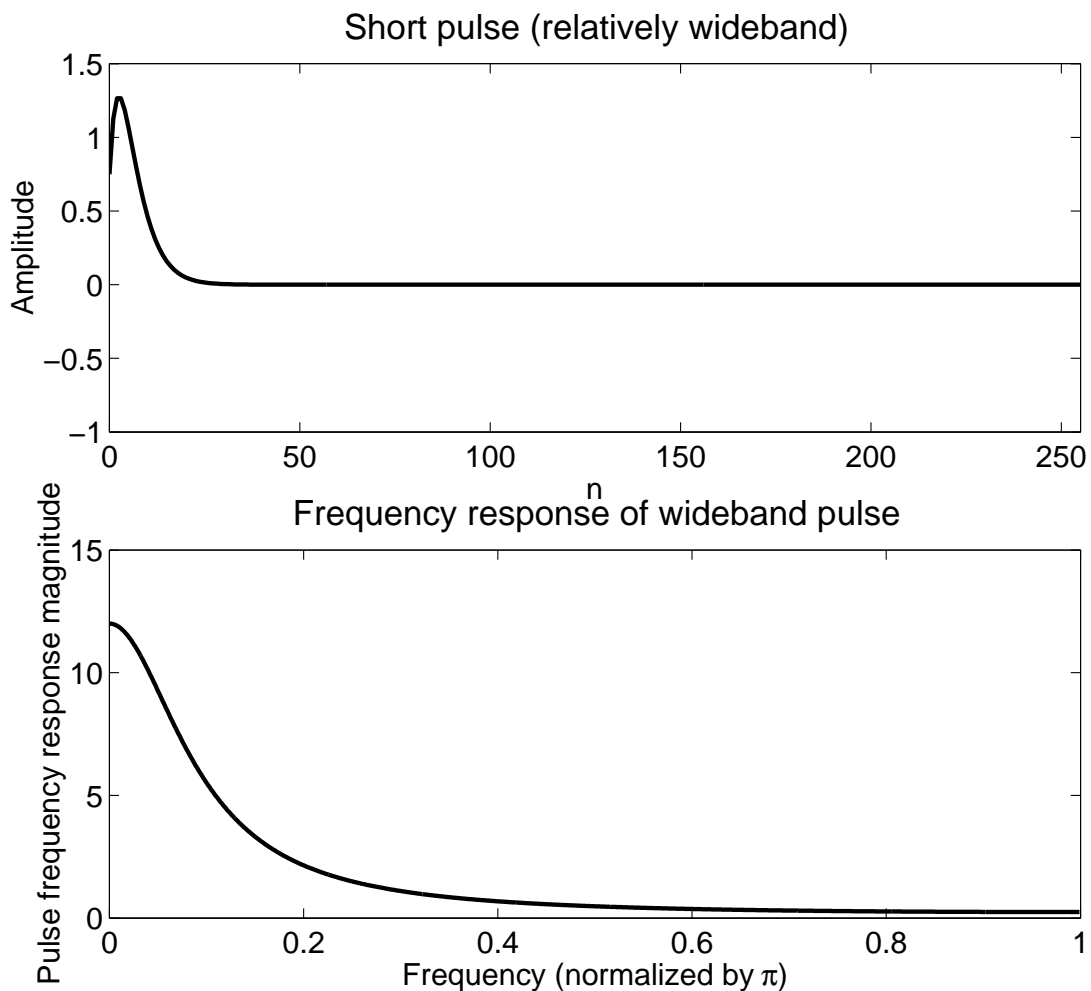
IIR filter: Input/Output signals: $x_2[n]$ and $y_2[n]$



Are the signals delayed by the right amounts?

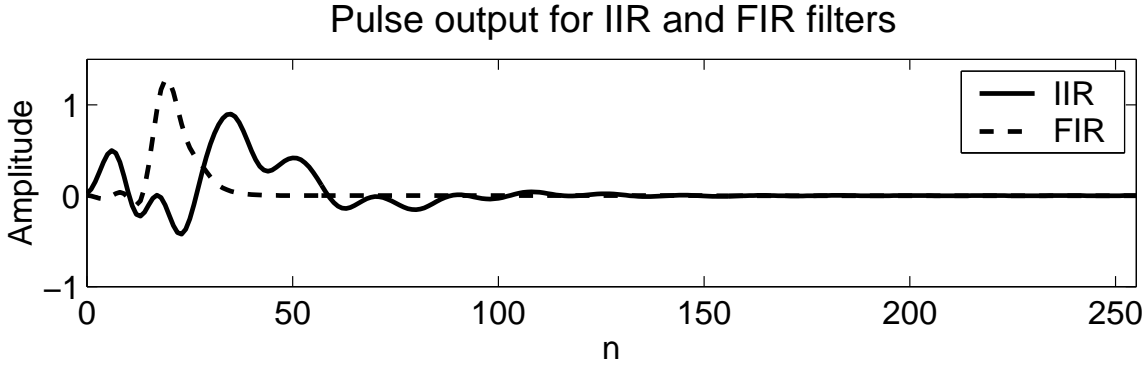
Consider a wideband pulse

Time signal and frequency response magnitude are shown below:



If this signal is input to FIR and IIR filters, what does output look like?

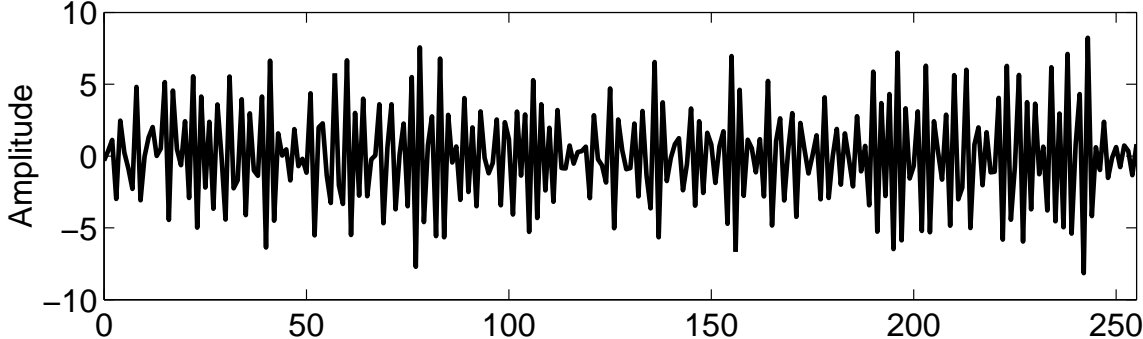
Wideband pulse output of FIR/IIR filters



Why does IIR pulse look so distorted?

Application: filtering noisy pulses

Input signal pnd_1



Filtered versions of pnd_1

