

Homework for Module 4

1. Using the Kaiser window, design a highpass filter with the following specifications:
 $\omega_p=0.6\pi$, $\omega_s=0.5\pi$ and $R_s=40\text{dB}$. Plot the impulse response and the frequency response magnitude.
2. Using the Dolph-Chebyshev window, design a bandpass filter of minimum order with the following specifications: $\omega_{p1}=0.4\pi$, $\omega_{p2}=0.6\pi$, $\omega_{s1}=0.3\pi$, $\omega_{s2}=0.7\pi$ and $R_p=4\text{dB}$, $R_s=40\text{dB}$.
Normalize the impulse response coefficients such that the gain at the center of the passband $(\omega_{p1}+\omega_{p2})/2$ is 0dB . Plot the impulse response and the frequency response magnitude. Show clearly that your design meets all specifications by plotting the specification template on the frequency response graph. You will find the MATLAB function *chebwin* helpful for this problem. Please note that some trial and error will likely be required to achieve the design specifications.
3. Following the approach presented in the lecture, show that the Type III FIR response must have a zero at $z=-1$.