10.36 Determine the weighting function $W(\omega)$ that is to be used to design a Type 1 linear-phase FIR lowpass filter using the Parks–McClellan method to meet the following specifications: $\omega_p = 0.4\pi$, $\omega_s = 0.55\pi$, $\delta_p = 0.18$, and $\delta_s = 0.035$.

M 10.10 Using the windowed Fourier series approach, design a linear-phase FIR lowpass filter of lowest order with the following specifications: passband edge at 0.3π, stopband edge at 0.4π, and minimum stopband attenuation of 42 dB. Which window function is appropriate for this design? Show the impulse response coefficients, and plot the gain response of the designed filter. Comment on your results. Do not use the M-file `fir1`.

M 10.23 Design the linear-phase FIR lowpass filter of Problem10.36 using the function `firpm` and plot its magnitude response.

11.21 If M DFT samples of the N-point DFT of a length-N are required with $M \leq N$, what is the smallest value of M for which the N-point radix-2 FFT algorithm is computationally more efficient than a direct computation of the M DFT samples? What are the values of M for the following values of N: (a) $N = 512$, (b) $N = 1024$, and (c) $N = 2048$.

11.24 Develop the flow-graph for a mixed-radix DIT FFT algorithm for the $N = 15$ case in which the input is in digit-reversed order and the output is in the normal order.