Problem 1. The second paragraph of page 259 of the textbook describes a strategy for calculating numerical approximations to $\phi$ and $\psi$. Explain this strategy, and use it to plot (in Matlab) the Daubechies orthogonal scaling function $\phi$ and orthogonal wavelet $\psi$, for $p = 3$ and $p = 5$ ($p$ is the number of vanishing moments of $\psi$). You may use the Matlab wavelet toolbox (for the available commands and help topics, type `help wavelet`); however, you must implement the procedure of page 259. Submit the Matlab code and the four plots.

Problem 2. Problem 7.6(a,b,c) from the textbook. You do not have to do Part (d). Note: there is a typo in the definition of $\phi_L[n]$. Please use the correct definition which is:

$$\phi_L[n] = 2^{-L/2}\phi(n).$$

Problem 3. Problem 8.3 from the textbook.

Problem 4. (a) Explain Eq. (8.16) from the textbook (i.e., provide a clearer explanation than the paragraph preceding it in the text).

(b) Consider a binary wavelet packet tree for the Shannon wavelet, with the finest scale 2^0 and coarsest scale 2^4. At each node, the left child corresponds to filtering with the low-pass filter and downsampling, and the right child corresponds to filtering with the high-pass filter and downsampling. Re-order the sixteen leaf nodes of the tree according to increasing frequency. (This was done in class for a tree with four leaf nodes.)