Tutorial Questions:
Non-Recursive Digital Filters

1. What is the frequency domain representation for an ideal low pass filter with cut-off frequency Ω_1? Write the equation and sketch the function.

2. What is the time domain impulse response for an ideal low pass frequency response filter with $\Omega_1 = \pi/2$? (Calculate and sketch the result).

3. What is the period for a time domain sinc function?

4. What is a window function used for in FIR filter design?

5. What is Gibbs ringing? Explain in 3 sentences and draw a labelled sketch of Gibbs ringing.

6. Give the name and equation for a commonly used window function in FIR filter design.

7. Sketch the frequency domain response of the window (above) which has been convolved (convolution in frequency domain) with an ideal low pass filter. Label the sketch with the following filter parameters: stop band, transition width, pass band, cut-off frequency, passband ripple, stopband ripple.

8. How much attenuation (in decibels) should there be at the cut-off frequency (or half power point)?

9. Give the equation for the time domain filter coefficients for a band pass FIR filter using an ideal low pass filter and window function $w[n]$.

10. How can the bandpass filter be made into a high pass filter? Sketch the transformation of the frequency responses.