ELEC9721: Digital Signal Processing Theory and Applications

Lab 2A

You will need the filter that you prepared in the Lab 2 Preparation.

Define a signal x[n]=[1, 3, 5, 7, 9, 11, 9, 7, 5, 3, 1]. Pass x[n] through this filter.

1. Show your work from your preparation (when there is time – don't wait to start the rest of the lab before you show this) – **2 marks**
2. Use your convolution code from the preparation to calculate the output of the filter for this signal. Plot that output **2 ma**rks
3. Use the '**filter**' command to produce a second output and compare with yours. What is wrong with the **'filter'** output? Fix this output so the two are the same (hint: use "help filter" and look at zi, zf….). Using the '**subplot**' command, plot:
    a. The signal x[n]
    b. Output of convolution,
    c. Output of applying '**filter**' command
    d. The corrected '**filter**' command output

    3 marks
4. Now using the following relationship to calculate the output using
    a. 11 point DFT
    b. 15 point DFT

$$x(n) * h(n) \quad \Leftrightarrow \quad X(\theta)H(\theta)$$
$$x(n) \otimes h(n) \quad \Leftrightarrow \quad X(k)H(k)$$

    c. Plot all the results in (a)&(b) using '**subplot**' and compare the results with those results you obtained earlier.

    3 marks