Due 7 March 1997 at 5:00 PM

EE 438 Assignment No. 6 Spring 1997

1. Derive a decimation-in-time FFT algorithm for a 12 point DFT, and draw a *complete* flow diagram for the algorithm.

2. You have software for a radix-2 FFT algorithm; but you need to compute a DFT that is exactly 320 points in length. Devise an efficient algorithm for doing this which makes use of your radix-2 FFT software.

3. You have software to compute the forward DFT, but no software to compute the inverse DFT. Devise an approach to using your foward FFT software to actually compute the inverse DFT by first preprocessing the data, taking a forward DFT, then performing some postprocessing on the output from the FFT algorithm.

4. Consider the following length 10 sequences:

   a. Calculate the aperiodic convolution of $x_1[n]$ and $x_2[n]$.

   b. Calculate the periodic (period 10) convolution of $x_1[n]$ and $x_2[n]$.

n	0	1	2	3	4	5	6	7	8	9
$x_1[n]$	5	4	3	2	1	0	0	0	0	0
$x_2[n]$	1	1	1	0.5	0.5	0.5	0	0	-0.5	-0.5

   c. To what length would the sequences need to be padded with zeros so that a portion of their periodic convolution would match the nonzero part of their aperiodic convolution?