

# CMS C 641

## Homework 3

### Reading Assignment:

- Listen to Sergei Prokofiev's Classic Symphony
- Read all of Chapter 30, and also Section 4.2 of Chapter 4 of text. Read Chapter 2 of Algorithms by DPV

### Homework:

- 1) Show how to use the divide-and-conquer integer multiplication algorithm to multiply the two binary numbers **10011011** and **10111010**.
- 2) Compute  **$FFT(1,1,0,1)$** . What is the value of the principal root of unity  $\omega$  that you used in the algorithm? Be sure to show your work.
- 3) Compute  **$FFT^{-1}(1,0,1,1)$** . Be sure to show your work.

- 4) Show how to compute the convolution of  **$(1,1,0,1)$**  and  **$(1,0,1,1)$**  using the  **$FFT$** .

For this problem, you may use Mathematica or Maple, provided you use neither the Mathematica nor the Maple  **$FFT$**  function.

- 5) Use Strassen's algorithm to compute the matrix product

$$\begin{pmatrix} 1 & 3 \\ 7 & 5 \end{pmatrix} \begin{pmatrix} 6 & 8 \\ 4 & 2 \end{pmatrix}$$

Be sure to show your work.