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Math128B: Numerical Analysis
Homework #5, Due March 2, 2009

- **Section 8.6**: Problems **2, 4, 8, 9, 10**.
- The Toepliz matrix is a matrix whose entries remain constant along each diagoanl. For example, the following is a 4×4 Toepliz matrix

$$T_4 = \begin{pmatrix} a_0 & a_1 & a_2 & a_3 \\ a_{-1} & a_0 & a_1 & a_2 \\ a_{-2} & a_{-1} & a_0 & a_1 \\ a_{-3} & a_{-2} & a_{-1} & a_0 \end{pmatrix}.$$

  Let T be an $n \times n$ Toepliz matrix and let x be an n-dimensional vector. Show how to compute the matrix-vector product Tx in $O(n \log n)$ operations using the FFT.