

# Math 471: Numerical Analysis

## Worksheet #3: Wednesday, September 17, 2008

1. Let

$$\mathbf{A} = \begin{bmatrix} 60 & 30 & 20 \\ 30 & 20 & 15 \\ 20 & 15 & 12 \end{bmatrix} \quad \text{and} \quad \mathbf{b} = \begin{bmatrix} 1 \\ -1 \\ 1 \end{bmatrix}$$

- (a) Use **LU**-factorization so solve  $\mathbf{Ax} = \mathbf{b}$ . Compute, from this factorization, the Doolittle, Crout and Cholesky factorizations of  $\mathbf{A}$ .
  - (b) Use the `chol` command to compute a Cholesky factorization of  $\mathbf{A}$ . Then use it to solve  $\mathbf{Ax} = \mathbf{b}$ .
2. I have put new versions of `AOTwoD.m` and `AOneD.m` on the web site. Please use these for the next problem.

Modify the code `AOTwoD.m` so that it uses, instead of Gaussian elimination, a Cholesky factorization of the coefficient matrix  $\mathbf{A}$ . This is actually what is done on many AO systems in practice.

On the next homework assignment, I will have you hand in a listing of your code and a plot of your reconstructions, which should be the same as when Gaussian elimination is used.