

COT 4501 Homework 3, Fall 2009

Assigned Thurs Sept 17, Due Thurs Sept 24

Assigned Thurs Sept 17. Due Thur Sept 24 at the very start of class (2 minutes after the start of class is late; no late assignments accepted ... unless you have the Swine Flu or are otherwise sick).

Be sure to read the homework policy in the syllabus, at:

<http://www.cise.ufl.edu/~davis/cot4501>

Review problems: R2.12 to R2.15, R2.18 to R2.21, R2.36, R2.49,

Exercises: E2.5, E2.7, E2.8, E2.13, E2.16 (assume no pivoting), E2.18.

Computer problems (use MATLAB): C2.10, and the problem below.

Additional computer problem: Write a recursive LU factorization algorithm, with no pivoting. It must compute L row-by-row and U column-by-column. Start with the following 2-by-2 block matrix form:

$$\begin{bmatrix} L_{11} & 0 \\ L_{21} & L_{22} \end{bmatrix} \begin{bmatrix} U_{11} & U_{12} \\ 0 & U_{22} \end{bmatrix} = \begin{bmatrix} A_{11} & A_{12} \\ A_{21} & A_{22} \end{bmatrix}$$

where L_{22} , U_{22} , and A_{22} , are each scalars. The L_{11} , U_{11} , and A_{11} , are each $(n-1)$ -by- $(n-1)$ in size. Derive the algorithm (show your work) and then write a MATLAB function. Write a test code that tests your LU factorization function. Check the norm of $L*U-A$, divided by the norm of A , using a range of square random test matrices (from `rand`).