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Assignment #8 Due Tue, Mar 8

1. (JPE, September 1993). Solve the system

$$\left(\begin{array}{cc} 0.001 & 1.00\\ 1.00 & 2.00 \end{array}\right) \left(\begin{array}{c} x\\ y \end{array}\right) = \left(\begin{array}{c} 1.00\\ 3.00 \end{array}\right)$$

using the LU decomposition with and without partial pivoting and chopped arithmetic with base $\beta = 10$ and t = 3 (i.e., work with a three digit mantissa). Obtain computed solutions (x_c, y_c) in both cases. Find the exact solution, compare, make comments.

2. (JPE, May 2003). Consider the system

$$\left(\begin{array}{cc}\varepsilon & 1\\ 2 & 1\end{array}\right)\left(\begin{array}{c}x\\y\end{array}\right) = \left(\begin{array}{c}1\\0\end{array}\right)$$

Assume that $|\varepsilon| \ll 1$. Solve the system by using the LU decomposition with and without partial pivoting and adopting the following rounding off models (at all stages of the computation!):

$$\begin{aligned} a + b\varepsilon &= a \quad (\text{for } a \neq 0), \\ a + b/\varepsilon &= b/\varepsilon \quad (\text{for } b \neq 0). \end{aligned}$$

Find the exact solution, compare, make comments.