

Homework 3: Unavoidable Errors
Assigned on 10/1/2015 (Thursday) and Due on 10/22/2015 (Thursday)

Problem 1: Roundoff error (20 points)

Perform Gaussian elimination on

$$x_1 + x_2 + x_3 = 1$$

$$x_1 + 1.0001x_2 + 2x_3 = 2$$

$$x_1 + 2x_2 + 2x_3 = 1$$

without pivoting. Use three-figure floating point arithmetic during back substitution. Now conduct pivoting by interchanging equations 2 and 3. What conclusion can you draw from this exercise?

Problem 2: Relative convergence criteria (15 points)

The absolute and relative convergence criteria in Equation (5.12) of the textbook are $|x_k - x_{k-1}| < \Delta_a$ and $|(x_k - x_{k-1}) / x_{k-1}| < \delta_r$, respectively. However, the convergence criteria in Example 5.6 of the textbook are written as, for example,

`while abs(r-rolld)/rolld>delta & it<maxit`

Is this an error? Should the `while` statement have a `<` sign instead of a `>` sign? Why?