Homework 3: Unavoidable Errors
Assigned on 10/11/2016 (Tuessday) and Due on 10/18/2016 (Tuesday)

Problem 1: Roundoff error (20 points)
Perform Gaussian elimination on

$$x_1 + \quad x_2 + \quad x_3 = 1$$
$$x_1 + 1.0001x_2 + 2x_3 = 2$$
$$x_1 + \quad 2x_2 + 2x_3 = 1$$

without pivoting. Use three-figure floating point arithmetic during backward substitution. This means that we can keep all the digits during the calculation, but keep only three digits after the decimal point in the last step of backward 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,

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while abs(r-rold)/rold)>delta & it<maxit
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Is this an error? Should the while statement have a < sign instead of a > sign? Why?