

## CHEN.3170 Applied Engineering Problem Solving

### *A Short Quiz on*

### *Implementation of Discrete Equations within a Matlab Function*

The Gauss Elimination method for solving a system of linear algebraic equations is a two-step process. The first step performs row operations to put the original system of equations into “row echelon” or “upper triangular” form. Once the system is in this form, a relatively simple process known as “back substitution” will give the desired solution vector.

A discrete representation of the back-substitution process for solving  $\underline{\underline{U}}\underline{x} = \underline{z}$  can be written for the general case of N equations as follows:

$$x_N = \frac{z_N}{u_{NN}} \quad \text{and} \quad x_i = \frac{1}{u_{ii}} \left( z_i - \sum_{j=i+1}^N u_{ij}x_j \right) \quad \text{for } i = N-1, N-2, \dots, 1$$

**Your job is to write a complete Matlab function file that implements this discrete procedure.** The function receives the upper triangular matrix,  $\underline{\underline{U}}$ , and right hand side vector,  $\underline{z}$ , from the main program and returns the solution vector,  $\underline{x}$ , to the calling routine. For consistency, assume that the first line of the function file is given by

**function x = backsub(U, z)**

Be careful to use proper Matlab syntax in your program!