**PAF-Karachi Institute of Economics and Technology**

**College of Computing and Information Sciences**

**Course : Discrete Mathematics Quiz -2**

**Faculty : Adnan Ullah Khan Max Marks : 50**

**Class ID : 107269 Time : 90 Min**

A = last digit of student’s ID

Q#1. a. Solve by back-substitution:

b. Solve by forward-substitution:

Q#2. Solve the following (given as the augmented matrix):

Q#3. Here is a system of equations that is called "ill- conditioned," meaning that the solution is not easy to get accurately. Section 2.4 discusses this; here, we give a "taste" of the problem. This is the system as an augmented matrix:

You can see that x = [I, 1, 1]T is the solution.

a. Confirm the solution by doing naive Gaussian elimination using exact arithmetic (use fractions throughout).

b. Now get the solution using only three significant figures in your computations. Observe that the solution is different.

c. Compute the solution when the system is changed only slightly: Change the coefficient in the first column of the first row to 3.1. Use more precise computations, perhaps single or even double precision. Observe that this makes a large change in the solution.

Q#4. Solve this system by Gaussian elimination with partial pivoting:

a. How many row interchanges are needed?  
b. Solve again but use only three significant digits of precision.  
c. Repeat part (b) without any row interchanges. Do you get the same results?

Q#5 The function f(x) = Ax3 - A - exp (x2/2)*.*

a. What is the derivative off?  
b. If you begin Newton's method at x = 2, which root is reached? How many iterations to achieve an error less than 10-5  
c. Begin Newton's method at another starting point to get the other zero.  
d. For both parts (b) and (c), tabulate the number of correct digits at each iteration.