1 Assignment 2 - Solving Sets of Linear Equations - Due to December 7, 2009

1. Solve the following linear system by using *Gauss-Jordan Method*;

$$x_1 + 2x_2 + x_3 + 4x_4 = 13$$
$$2x_1 + 4x_3 + 3x_4 = 28$$
$$4x_1 + 2x_2 + 2x_3 + x_4 = 20$$
$$-3x_1 + x_2 + 3x_3 + 2x_4 = 6$$

   (a) Solve by <u>hand</u>.
   (b) Solve by MATLAB. **Hint:** Modify the MATLAB code for *Upper Triangularization Followed by Back Substitution / Gaussian Elimination with pivoting*, (uptrbk.m and/or GEPivShow.m)).

2. Modify the MATLAB code for $PA = LU$:*Factorization with Pivoting* (lufact.m) so that L, U and P are output, then by using the modified code, solve the following linear system;

$$x_1 + 2x_2 + 4x_3 + x_4 = 21$$
$$2x_1 + 8x_2 + 6x_3 + 4x_4 = 52$$
$$3x_1 + 10x_2 + 8x_3 + 8x_4 = 79$$
$$4x_1 + 12x_2 + 10x_3 + 6x_4 = 82$$

   Hints: You can check your results by using MATLAB as;

```
>>[L,U,P]=lu(A)
>>inv(P)*L*U
```

3. Solve the following linear system by using *Gauss-Seidel Iteration*;

$$4x - y + z = 7$$
$$-2x + y + 5z = 15$$
$$4x - 8y + z = -21$$

   - Start by $P_0 = (1, 2, 2)$.
   - Tabulate the iteration. Compare with the *Jacobi Iteration*.

   Hint: Modify the MATLAB code for *Jacobi Iteration* (jacobi.m).