Quiz 1

Due: Friday Jan 23, 2015

Student's Name: _____   Student's ID#: _____

Student's NetID: _____

- Box your final answers
- Show your steps for partial credits

Problem 1. Let **A** be a 40×60 a matrix and **v** be a 40×1 vector. In Matlab, write the code that does the following:

(a)   Access the next-to-last column of **A**.   (4 points)

   A(:,end-1)   or   A(:,59)

(b)   Returns a new 60×1 vector containing the matrix multiplication product of **A** and **v**.   (4 points)

   A'*v

Problem 2. Write down the values of the indicated variables after the execution of the following programs:

```
count=0;
for j=1:2:10
   count=count+1;
   if j==5, break; end
end
```

```
x=[1 -5 2 4];
v=norm(x,inf);
```

count= _____3_____ (4 points)   v= _____5_____ (4 points)

Problem 3. Let **A** be a 4×4 matrix. Consider the Matlab statement `[G1,G2,G3] = lu(A)`.

(a) If **v** is a 4×1 vector, then which (Gaussian Elimination, forward substitution, or back substitution) will be carried out for the statement `G1\v`?   (4 points)

   Forward substitution

(b) What will the following Matlab statement return?   (4 points)

   `diag(G1)=` [1 1 1 1]'   or   ones(4,1)
   also accept [1 1 1 1] and ones(1,4) without transpose

Problem 4. Let $\mathbf{A} = \begin{bmatrix} 1 & 2 & -2 \\ 1 & 1 & 1 \\ 2 & 2 & 1 \end{bmatrix}$ and $\mathbf{b} = \begin{bmatrix} 7 \\ 2 \\ 5 \end{bmatrix}$. The linear system $\mathbf{Ax} = \mathbf{b}$ has the solution $\mathbf{x} = \begin{bmatrix} 1 \\ 2 \\ -1 \end{bmatrix}$. The solution is to be obtained using iterative methods. In Matlab, define `B1=diag(diag(A))`, `B2=tril(A)`, and `B3=triu(A)`. Furthermore, `[V1,D1]=eig((B1+B2)\B3)` and `[V2,D2]=eig(B1\(B2+B3))`, where `D1=diag([0,-2,-2])` and `D2=diag([0,0,0])`.

(a) Is **A** strictly diagonally dominant? Why?   (4 points)

   No.   (2pts)
   Because $|a_{11}| < |a_{12}|+|a_{13}|$ or any other rows   (2 pts)

(b) Will the Jacobi's method converge? Why?   (4 points)

   Yes.   (2pts)
   Because eigenvalues D2 are zeros, i.e. absolute values less than one   (2 pts)