**Numerical Computation - Assignment 6**

**薛劭杰 1930026143**

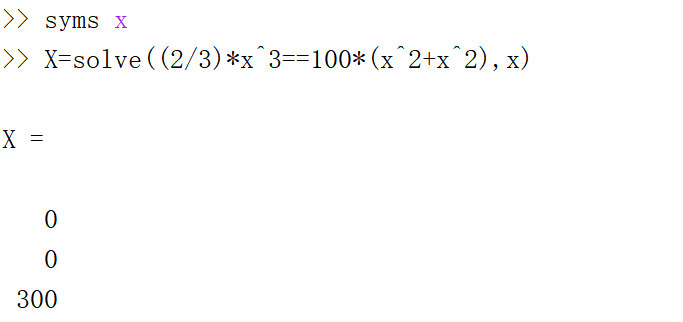
**Q1.**

The number of flops to create L and U is equal to Gaussian Elimination is:

The number of flops for forward substitution is:

The number of flops for backward substitution is:

Build equation:



**Q2.**

Expand this expression:

Then use to replace the all , and since

.

Take the :

.

Q3.

A is a diagonal matrix =

norm: .

norm: A is a diagonal matrix, then is also a diagonal matrix. The eigenvalues of

are equal to the element values in this diagonal, so the maximum eigenvalue of is 1.

.

norm: .

Q4.

1. Initially, transform the linear system to matrix

.

Then use the Gaussian elimination to get the solution:

by .

By back substitution, . actual solution .

The approximation solution , so .

, .

And then calculate . .

, .

The relative forward error:

The relative backward error:

The error magnification factor:

1. Let , .

If , then and

,

, condition number of

Q5.

1. ,

, 6001

Condition number of .

1. . e

The relative forward error:

residual .

The relative backward error:

The error magnification factor:

, e

since .

residual .

,

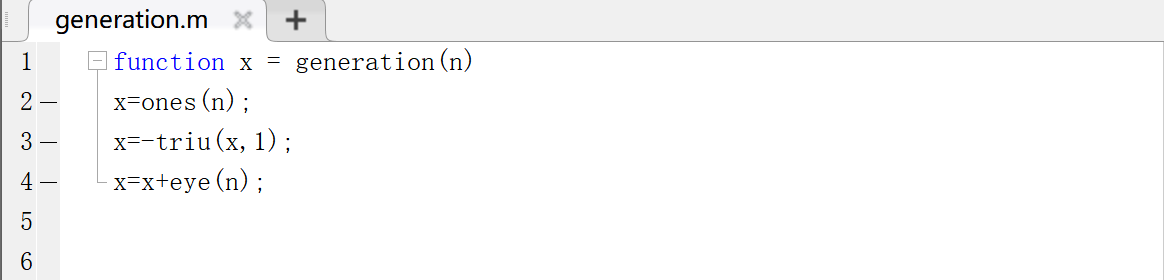
The relative forward error:

The relative backward error:

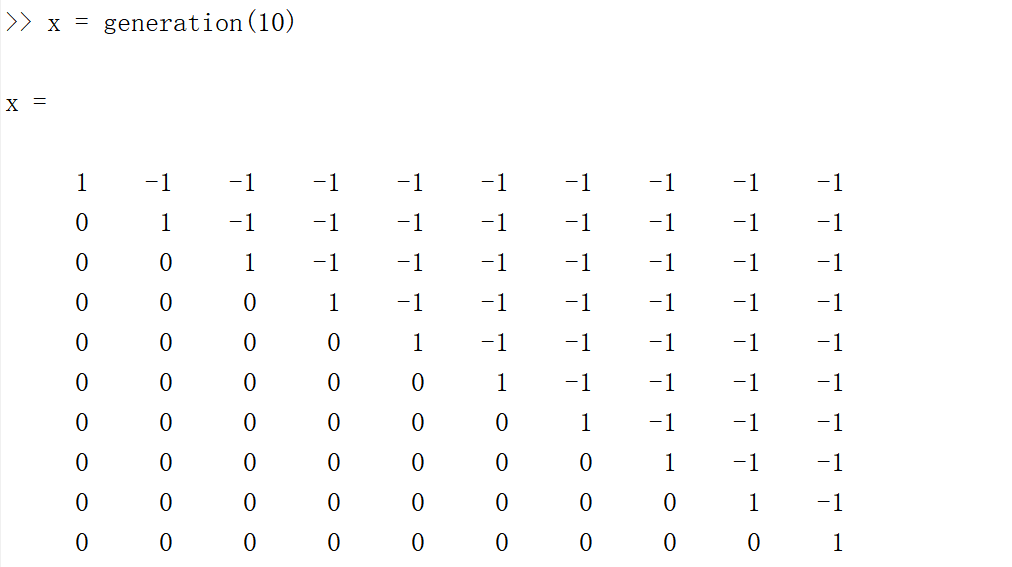
The error magnification factor:

According to the (a), the condition number of is which is equal to the error magnification factor of approximation solution for any .

Q6.



Test the function by :



,

When

When

When

When

…

By induction, we can find that the inverse matrix of A

Since ,.

Condition number of .