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## Exercises

Section 7.1: 1, 5, 6

1. Show that the system of equations

$$\begin{cases} x_1 + 4x_2 + \alpha x_3 = 6 \\ 2x_1 - x_2 + 2\alpha x_3 = 3 \\ \alpha x_1 + 3x_2 + x_3 = 5 \end{cases}$$

possesses a unique solution when  $\alpha = 0$ , no solution when  $\alpha = -1$ , and infinitely many solutions when  $\alpha = 1$ . Also, investigate the corresponding situation when the right-hand side is replaced by 0's.

Answer:

When  $\alpha = 0$

$$\begin{cases} x_1 + 4x_2 = 6 \\ 2x_1 - x_2 = 3 \\ 3x_2 + x_3 = 5 \end{cases} \Leftrightarrow \begin{cases} x_1 = 2 \\ x_2 = 1 \\ x_3 = 2 \end{cases}$$

When  $\alpha = -1$

$$\begin{cases} x_1 + 4x_2 - x_3 = 6 \\ 2x_1 - x_2 - 2x_3 = 3 \\ -x_1 + 3x_2 + x_3 = 5 \end{cases} \Leftrightarrow \begin{cases} x_1 + 4x_2 - x_3 = 6 \\ -9x_2 = -9 \\ 7x_2 = 11 \end{cases} \Leftrightarrow \begin{cases} x_1 + 4x_2 - x_3 = 6 \\ x_2 = 1 \\ 0 = 4 \end{cases}$$

Hence, When  $\alpha = -1$  the system possesses no solution

When  $\alpha = 1$

$$\begin{cases} x_1 + 4x_2 + x_3 = 6 \\ 2x_1 - x_2 + 2x_3 = 3 \\ x_1 + 3x_2 + x_3 = 5 \end{cases} \Leftrightarrow \begin{cases} x_1 + 4x_2 - x_3 = 6 \\ -9x_2 = -9 \\ x_2 = 1 \end{cases} \Leftrightarrow \begin{cases} x_1 = \text{infinite} \\ x_2 = 1 \\ x_3 = \text{infinite} \end{cases}$$

Hence, When  $\alpha = 1$  the system possesses many solution (infinitely).

when the right-hand side is replaced by 0's

When  $\alpha = 0$

$$\begin{cases} x_1 + 4x_2 = 0 \\ 2x_1 - x_2 = 0 \\ 3x_2 + x_3 = 0 \end{cases} \Rightarrow \text{Have no solution}$$

Hence, When  $\alpha = 0$  the system possesses no solution

When  $\alpha = -1$

$$\begin{cases} x_1 + 4x_2 - x_3 = 0 \\ 2x_1 - x_2 - 2x_3 = 0 \\ -x_1 + 3x_2 + x_3 = 0 \end{cases} \Leftrightarrow \begin{cases} x_1 + 4x_2 - x_3 = 0 \\ -9x_2 = 0 \\ 0 = 0 \end{cases} \Leftrightarrow \begin{cases} x_1 = \text{infinite} \\ x_2 = 0 \\ x_3 = \text{infinite} \end{cases}$$

Hence, When  $\alpha = -1$  the system possesses many solution (infinitely).

When  $\alpha = 1$

$$\begin{cases} x_1 + 4x_2 + x_3 = 0 \\ 2x_1 - x_2 + 2x_3 = 0 \\ x_1 + 3x_2 + x_3 = 0 \end{cases} \Leftrightarrow \begin{cases} x_1 + 4x_2 - x_3 = 0 \\ -9x_2 = 0 \\ x_2 = 0 \end{cases} \Leftrightarrow \begin{cases} x_1 = \text{infinite} \\ x_2 = 0 \\ x_3 = \text{infinite} \end{cases}$$

Hence, When  $\alpha = 1$  the system possesses many solution (infinitely).

## 5. Consider

$$A = \begin{bmatrix} 0.780 & 0.563 \\ 0.913 & 0.659 \end{bmatrix}, \quad b = \begin{bmatrix} 0.217 \\ 0.254 \end{bmatrix}$$

$$\tilde{x} = \begin{bmatrix} 0.999 \\ -1.001 \end{bmatrix}, \quad \hat{x} = \begin{bmatrix} 0.341 \\ -0.087 \end{bmatrix}$$

Compute residual vectors  $\tilde{r} = A\tilde{x} - b$  and  $\hat{r} = A\hat{x} - b$  and decide which of  $\tilde{x}$  and  $\hat{x}$  is the better solution vector. Now compute the error vectors  $e = \tilde{x} - x$  and  $\hat{e} = \hat{x} - x$ , where  $x = [1, -1]^T$  is the exact solution. Discuss the implications of this example.

Answer:

$$A = \begin{bmatrix} 0.780 & 0.563 \\ 0.913 & 0.659 \end{bmatrix}, \quad b = \begin{bmatrix} 0.217 \\ 0.254 \end{bmatrix}, \quad \tilde{x} = \begin{bmatrix} 0.999 \\ -1.001 \end{bmatrix}, \quad \hat{x} = \begin{bmatrix} 0.341 \\ -0.087 \end{bmatrix}$$

To compute:  $\tilde{r} = A\tilde{x} - b$

$$\tilde{r} = \begin{bmatrix} 0.780 & 0.563 \\ 0.913 & 0.659 \end{bmatrix} \begin{bmatrix} 0.999 \\ -1.001 \end{bmatrix} - \begin{bmatrix} 0.217 \\ 0.254 \end{bmatrix} = \begin{bmatrix} 0.215657 \\ 0.252428 \end{bmatrix} - \begin{bmatrix} 0.217 \\ 0.254 \end{bmatrix} = \begin{bmatrix} -0.001343 \\ -0.001572 \end{bmatrix}$$

To compute:  $\hat{r} = A\hat{x} - b$

$$\hat{r} = \begin{bmatrix} 0.780 & 0.563 \\ 0.913 & 0.659 \end{bmatrix} \begin{bmatrix} 0.341 \\ -0.087 \end{bmatrix} - \begin{bmatrix} 0.217 \\ 0.254 \end{bmatrix} = \begin{bmatrix} 0.2169999 \\ 0.2540000 \end{bmatrix} - \begin{bmatrix} 0.217 \\ 0.254 \end{bmatrix} = \begin{bmatrix} -0.0000001 \\ -0.0000000 \end{bmatrix}$$

$$x = [1, -1]^T$$

$$e = \tilde{x} - x = \begin{bmatrix} 0.999 \\ -1.001 \end{bmatrix} - \begin{bmatrix} 1 \\ -1 \end{bmatrix} = \begin{bmatrix} -0.001 \\ -0.001 \end{bmatrix}$$

$$\hat{e} = \hat{x} - x = \begin{bmatrix} 0.341 \\ -0.087 \end{bmatrix} - \begin{bmatrix} 1 \\ -1 \end{bmatrix} = \begin{bmatrix} -0.659 \\ 0.913 \end{bmatrix}$$

6. Consider the system

$$\begin{cases} 10^{-4}x_1 + x_2 = b_1 \\ x_1 + x_2 = b_2 \end{cases}$$

where  $b_1 \neq 0$  and  $b_2 \neq 0$ . Its exact solution is

$$x_1 = \frac{-b_1 + b_2}{1 - 10^{-4}}, \quad x_2 = \frac{b_1 - 10^{-4}b_2}{1 - 10^{-4}}$$

a. Let  $b_1 = 1$  and  $b_2 = 2$ . Solve this system using naive Gaussian elimination with three-digit (rounded) arithmetic and compare with the exact solution  $x_1 = 1.00010 \dots$  and  $x_2 = 0.99989 \dots$ .

b. Repeat the preceding part after interchanging the order of the two equations.

c. Find values of  $b_1$  and  $b_2$  in the original system so that naive Gaussian elimination does not give poor answers.

Answer:

a. Let  $b_1 = 1$  and  $b_2 = 2$ , three-digit (rounded)

$$\begin{cases} 10^{-4}x_1 + x_2 = 1 \\ x_1 + x_2 = 2 \end{cases}$$

$$\begin{bmatrix} 10^{-4} & 1 \\ 1 & 1 \end{bmatrix} \cdot \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = \begin{bmatrix} 1 \\ 2 \end{bmatrix}$$

$$\begin{bmatrix} 10^{-4} & 1 \\ 0 & -0.999 \end{bmatrix} \cdot \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = \begin{bmatrix} 1 \\ -0.999 \end{bmatrix}$$

$$x_2 = \frac{-0.999}{-0.999} = 1$$

$$x_1 = \frac{1-1}{10^{-4}} = 0$$

Hence,  $x_1 = 0$ ,  $x_2 = 1$ ,

b. After interchanging the order of the two equations

$$\begin{cases} x_1 + x_2 = 2 \\ 10^{-4}x_1 + x_2 = 1 \end{cases}$$

$$\begin{bmatrix} 1 & 1 \\ 10^{-4} & 1 \end{bmatrix} \cdot \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = \begin{bmatrix} 2 \\ 1 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 1 \\ 0 & 0.999 \end{bmatrix} \cdot \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = \begin{bmatrix} 2 \\ 0.999 \end{bmatrix}$$

$$x_2 = \frac{0.999}{0.999} = 1$$

$$x_1 = 2 - 1 = 1$$

Hence,  $x_1 = 1, x_2 = 1$ ,

- c. Find values of  $b_1$  and  $b_2$  in the original system so that naive Gaussian elimination does not give poor answers. Consider  $b_1 = b_2 = 1$

$$\begin{cases} 10^{-4}x_1 + x_2 = 1 \\ x_1 + x_2 = 1 \end{cases}$$

$$\begin{bmatrix} 10^{-4} & 1 \\ 1 & 1 \end{bmatrix} \cdot \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = \begin{bmatrix} 1 \\ 1 \end{bmatrix}$$

$$\begin{bmatrix} 10^{-4} & 1 \\ 0 & -0.999 \end{bmatrix} \cdot \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = \begin{bmatrix} 1 \\ -0.999 \end{bmatrix}$$

$$x_2 = \frac{-0.999}{-0.999} = 1$$

$$x_1 = \frac{1-1}{10^{-4}} = 0$$

Which is exactly,,  $x_1 = 0, x_2 = 1$ ,

## Section 7.2: 2, 7, 13(a)

2. Solve the following system using Gaussian elimination with scaled partial pivoting:

$$\begin{bmatrix} 1 & -1 & 2 \\ -2 & 1 & -1 \\ 4 & -1 & 2 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} -2 \\ 2 \\ -1 \end{bmatrix}$$

Show intermediate matrices at each step

Answer:

$$\begin{aligned} & \begin{bmatrix} 1 & -1 & 2 & : & -2 \\ -2 & 1 & -1 & : & 2 \\ 4 & -1 & 2 & : & -1 \end{bmatrix} \xrightarrow[R_3 = R_3 - 4R_1]{R_2 = R_2 + 2R_1} \begin{bmatrix} 1 & -1 & 2 & : & -2 \\ 0 & -1 & 3 & : & -2 \\ 0 & 3 & -6 & : & 7 \end{bmatrix} \xrightarrow{R_3 = R_3 + 3R_2} \begin{bmatrix} 1 & -1 & 2 & : & -2 \\ 0 & -1 & 3 & : & -2 \\ 0 & 0 & 3 & : & 1 \end{bmatrix} \\ & \xrightarrow{R_2 = R_2 - R_3} \begin{bmatrix} 1 & -1 & 2 & : & -2 \\ 0 & -1 & 0 & : & -3 \\ 0 & 0 & 3 & : & 1 \end{bmatrix} \xrightarrow[R_1 = R_1 - R_2]{R_1 = R_1 - \frac{2}{3}R_3} \begin{bmatrix} 1 & 0 & 2 & : & 1 \\ 0 & -1 & 0 & : & -3 \\ 0 & 0 & 3 & : & 1 \end{bmatrix} \xrightarrow{R_2 = (-1) \cdot R_2; R_3 = \frac{R_3}{3}} \begin{bmatrix} 1 & 0 & 0 & : & \frac{1}{3} \\ 0 & 1 & 0 & : & 3 \\ 0 & 0 & 1 & : & \frac{1}{3} \end{bmatrix} \end{aligned}$$

Then, 
$$\begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} \frac{1}{3} \\ 3 \\ \frac{1}{3} \end{bmatrix}$$

7. If the Gaussian elimination algorithm with scaled partial pivoting is used on the example shown, which row will be selected as the third pivot row?

$$\begin{bmatrix} 8 & -1 & 4 & 9 & 2 \\ 1 & 0 & 3 & 9 & 7 \\ -5 & 0 & 1 & 3 & 5 \\ 4 & 3 & 2 & 2 & 7 \\ 3 & 0 & 0 & 0 & 9 \end{bmatrix}$$

Answer: S = {9,9,5,7,9} Scale vector

Pivot:  $8/9 = 0.889$ ;  $1/9 = 0.11$ ;  $5/5=1$ ;  $4/7 = 0.57$ ;  $3/9 = 0.33$

So first max pivot is row 3.

$$\begin{bmatrix} 8 & -1 & 4 & 9 & 2 \\ 1 & 0 & 3 & 9 & 7 \\ -5 & 0 & 1 & 3 & 5 \\ 4 & 3 & 2 & 2 & 7 \\ 3 & 0 & 0 & 0 & 9 \end{bmatrix} \rightarrow \begin{bmatrix} 0 & -1 & 5.6 & 13.8 & 10 \\ 0 & 0 & 3.2 & 9.6 & 8 \\ -5 & 0 & 1 & 3 & 5 \\ 0 & 3 & 2.8 & 4.4 & 11 \\ 0 & 0 & 0.6 & 1.8 & 12 \end{bmatrix}$$

S = {9,9,7,9} Scale vector. Skip row 3

Pivot:  $1/9 = 0.11$ ;  $0/9= 0$ ;  $3/7 = 0.43$ ;  $0/9 = 0$

So second max pivot is row 4.

$$\begin{bmatrix} 8 & -1 & 4 & 9 & 2 \\ 1 & 0 & 3 & 9 & 7 \\ -5 & 0 & 1 & 3 & 5 \\ 4 & 3 & 2 & 2 & 7 \\ 3 & 0 & 0 & 0 & 9 \end{bmatrix} \rightarrow \begin{bmatrix} 0 & -1 & 5.6 & 13.8 & 10 \\ 0 & 0 & 3.2 & 9.6 & 8 \\ -5 & 0 & 1 & 3 & 5 \\ 0 & 3 & 2.8 & 4.4 & 11 \\ 0 & 0 & 0.6 & 1.8 & 12 \end{bmatrix} \rightarrow \begin{bmatrix} 0 & 0 & 6.53 & 15.27 & 13.67 \\ 0 & 0 & 3.2 & 9.6 & 8 \\ -5 & 0 & 1 & 3 & 5 \\ 0 & 3 & 2.8 & 4.4 & 11 \\ 0 & 0 & 0.6 & 1.8 & 12 \end{bmatrix}$$

S = {9,9,9} Scale vector. Skip row 4

Pivot:  $6.53/9 = 0.73$ ;  $0.32/9= 0.036$ ;  $0.6/9 = 0.0666$

So third max pivot is row 1.

13. Solve each of the following systems using Gaussian elimination with scaled partial pivoting. Carry four significant figures. What are the contents of the index array at each step?

$$\text{a. } \begin{cases} 3x_1 + 4x_2 + 3x_3 = 10 \\ x_1 + 5x_2 - x_3 = 7 \\ 6x_1 + 3x_3 + 7x_3 = 15 \end{cases}$$

Answer:

$$\left[ \begin{array}{ccc|c} 3 & 4 & 3 & 10 \\ 1 & 5 & -1 & 7 \\ 6 & 3 & 7 & 15 \end{array} \right]$$

Scales [4,5,7] used for pivot selection.

We have  $\frac{3}{4} = 0.75$ ;  $\frac{1}{5} = 0.2$ ;  $\frac{6}{7} = 0.857$

So first max pivot is row 3.

$$\left[ \begin{array}{ccc|c} 0 & 2.5 & -0.5 & 2.5 \\ 0 & 4.5 & -2.167 & 4.5 \\ 6 & 3 & 7 & 15 \end{array} \right]$$

Scales [4,5] used for pivot selection. Skip row 3

Pivot:  $2.5/4 = 0.625$ ;  $4.5/5 = 0.9$

So second max pivot is row 2.

$$\left[ \begin{array}{ccc|c} 0 & 0 & 0.7037 & 0 \\ 0 & 4.5 & -2.167 & 4.5 \\ 6 & 3 & 7 & 15 \end{array} \right]$$

Then  $x_3 = 0$ ,  $x_2 = 1$ ,  $x_1 = 2$ .

### Section 7.3: 1, 4, 5

1. What happens to the tridiagonal System (1) if Gaussian elimination with partial pivoting is used to solve it? In general, what happens to a banded system?

Answer:

When banded systems with  $n$  – diagonal with  $n > 3$ , we consider not eliminating consecutive rows in order will cause fill-in. It could lead to large amounts of fill-in. Because Gaussian elimination will attempt to add scale and rows of zeros to others, which is unnecessary. If the entries have noise (values near zero), the noise will be propagated to other rows, causing fill-in, and it is inefficient and numerically dangerous.

4. Give an example of a system of linear equations in tridiagonal form that cannot be solved without pivoting.

Answer:

$$\begin{bmatrix} 0 & 1 \\ 1 & 1 \end{bmatrix}$$

Consider example above, without pivoting, the system will use  $a_{11} = 0$  to be a pivot, then now try to make  $a_{12}$  to be 0. SO, this problem can not be solve to eliminate the first column and division by zero occurs.

Using a pivoting strategy will select the second row as the pivot, and now, the problem can be solved.

5. What is the appearance of a matrix A if its elements satisfy  $a_{ij} = 0$  when:

a.  $j < i - 2$

b.  $j > i + 1$

Answer:

a. Matrix A if its elements satisfy  $a_{ij} = 0$  when  $j < i - 2$ . Otherwise,  $a_{ij} = ?$ . Example:  $n = 6$

For i:n

For j:n

when  $j < i - 2 : a_{ij} = 0$

$$\begin{bmatrix} ? & ? & ? & ? & ? & ? \\ ? & ? & ? & ? & ? & ? \\ ? & ? & ? & ? & ? & ? \\ 0 & ? & ? & ? & ? & ? \\ 0 & 0 & ? & ? & ? & ? \\ 0 & 0 & 0 & ? & ? & ? \end{bmatrix}$$

b. Matrix A if its elements satisfy  $a_{ij} = 0$  when  $j > i + 1$ . Otherwise,  $a_{ij} = ?$ . Example:  $n = 6$

For i:n

For j:n

when  $j > i + 1 : a_{ij} = 0$

$$\begin{bmatrix} ? & ? & 0 & 0 & 0 & 0 \\ ? & ? & ? & 0 & 0 & 0 \\ ? & ? & ? & ? & 0 & 0 \\ ? & ? & ? & ? & ? & 0 \\ ? & ? & ? & ? & ? & ? \\ ? & ? & ? & ? & ? & ? \end{bmatrix}$$

## Computing Exercises

### Section 7.1: 3, 8

3. Define an  $n \times n$  matrix  $A$  by the equation  $a_{ij} = i + j$ . Define  $b$  by the equation  $b_i = i + 1$ . Solve  $Ax = b$  by using procedure Naive Gauss. What should  $x$  be?

**Answer:**

**Code:**

```
clc;

n = input("Enter amount nxn with n = ");
[A B] = Matrices(n)
X = Naive_Guass(n, A, B)

function [A B] = Matrices(n)
A = zeros(n,n);
B = zeros(n,1);
for i=1:n
for j=1:n
A(i,j) = rand();
end
B(i) = rand();
end
end

function X = Naive_Guass(n, A, B)
X = zeros(n, 1);
% Forward
for k=1:n-1
for i=k+1:n
temp = A(i, k)/A(k,k);
A(i,k) = temp;
for j=k+1:n
A(i,j) = A(i,j) - (temp) * A(k,j);
end
B(i) = B(i) - (temp) * B(k);
end
end
% Backward
sum = 0;
X(n) = B(n)/A(n,n);
for i=n-1:-1:1
sum = B(i);
for j=i+1:n
sum = sum - A(i,j) * X(j);
end
X(i) = sum/A(i,i);
end
end
```



### Sample run:

```
Enter amount nxn with n =
3

A =

    0.8147    0.9058    0.1270
    0.6324    0.0975    0.2785
    0.9575    0.9649    0.1576

B =

    0.9134
    0.5469
    0.9706

X =

   -0.9206
    1.3335
    3.5869
```

8. Select a reasonable value of  $n$ , and generate a random  $n \times n$  array  $a$  using a random number generator. Define the array  $b$  such that the solution of the system

$$\sum_{j=1}^n a_{ij}x_j = b_i \quad (1 \leq i \leq n)$$

is  $x_j = b_j$ , where  $1 \leq j \leq n$ . Test the naive Gaussian algorithm on this system. Hint: You may use the function `Random`, which is discussed in Chapter 13, to generate the random elements of the  $(a_{ij})$  array.

Answer:

#### Code:

```
clc;
n = input("Enter amount nxn with n = ");
[A B] = Matrices(n)
GuassElimination(n, A, B)

function [A B] = Matrices(n)
A = zeros(n,n);
B = zeros(n,1);
for i=1:n
for j=1:n
A(i,j) = rand();
end
B(i) = rand();
end
end

function X = GuassElimination(n, A, B)
a = [A B];
for j=1:n-1
```

```

    % forward elimination
    for i=j+1:n
        if (a(j,j)) == 0
            fprintf('Gauss elimination method fails due to divion by zero: %f.
\n',a);
            return
        else
            temp = (a(i,j)/a(j,j));
            end
            a(i,:)=a(i,:)-temp*a(j,:);    % elimination
        end
    end
end
fprintf('Matrix after forward elimination:\n');
disp(a)
x=zeros(n,1);
%Backward substitution
for s=n:-1:1
    sum=0;
    for k=s+1:n
        sum=sum+a(s,k)*x(k);
    end
    if (a(s,s)) == 0
        fprintf('Gauss elimination method fails due to divion by zero: %f. \n',a);
        return
    else
        temp = 1/a(s,s);
    end
    x(s)=temp*(a(s,n+1)-sum);
end
fprintf('Solution X:\n');
disp(x)
end

```

### Sample run:

```

Enter amount nxn with n =
3
A =
    0.9063    0.8797    0.8178
    0.5944    0.0225    0.4253
    0.1615    0.1788    0.4229

B =
    0.2607
    0.3127
    0.0942

Matrix after forward elimination:
    0.9063    0.8797    0.8178    0.2607
     0    -0.5544   -0.1110    0.1417
     0         0    0.2728    0.0534

Solution X:
    0.3972
   -0.2949
    0.1958

```

## Section 7.2: 2, 3

### 2. Consider the system

$$\begin{bmatrix} 0.4096 & 0.1234 & 0.3678 & 0.2943 \\ 0.2246 & 0.3872 & 0.4015 & 0.1129 \\ 0.3645 & 0.1920 & 0.3781 & 0.0643 \\ 0.1784 & 0.4002 & 0.2786 & 0.3927 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \end{bmatrix} = \begin{bmatrix} 0.4043 \\ 0.1550 \\ 0.4240 \\ 0.2557 \end{bmatrix}$$

Solve it by Gaussian elimination with scaled partial pivoting using procedures Gauss and Solve.

Answer:

Code:

```
clc;
```

```
[A B] = Matrices(4)
GuassElimination(4, A, B)
```

```
function [A B] = Matrices(n)
A = [0.4096 0.1234 0.3678 0.2943;
```

```
0.2246 0.3872 0.4015 0.1129;
```

```
0.3645 0.1920 0.3781 0.0643;
```

```
0.1784 0.4002 0.2786 0.3927];
```

```
B = [0.4043 0.1550 0.4240 0.2557];
end
```

```
function X = GuassElimination(n, A, B)
X = zeros(n, 1);
% Forward
for k=1:n-1
for i=k+1:n
temp = A(i, k)/A(k,k);
A(i,k) = temp;
for j=k+1:n
A(i,j) = A(i,j) - (temp) * A(k,j);
end
B(i) = B(i) - (temp) * B(k);
end
end
% Backward
sum = 0;
X(n) = B(n)/A(n,n);
for i=n-1:-1:1
sum = B(i);
for j=i+1:n
sum = sum - A(i,j) * X(j);
end
X(i) = sum/A(i,i);
end
```

end

Sample run:

```
A =  
  
    0.4096    0.1234    0.3678    0.2943  
    0.2246    0.3872    0.4015    0.1129  
    0.3645    0.1920    0.3781    0.0643  
    0.1784    0.4002    0.2786    0.3927  
  
B =  
  
    0.4043    0.1550    0.4240    0.2557  
  
ans =  
  
    3.4606  
    1.5610  
   -2.9342  
   -0.4301
```

3. (Continuation) Assume that an error was made when the coefficient matrix in Computer Problem 7.2.2 was typed and that a single digit was mistyped—namely, 0.3645 became 0.3345. Solve this system, and notice the effect of this small change. Explain.

Answer:

**Code:**

```
clc;  
  
[A B] = Matrices(4)  
GuassElimination(4, A, B)  
  
function [A B] = Matrices(n)  
A = [0.4096 0.1234 0.3678 0.2943;  
    0.2246 0.3872 0.4015 0.1129;  
    0.3345 0.1920 0.3781 0.0643;  
    0.1784 0.4002 0.2786 0.3927];  
  
B = [0.4043 0.1550 0.4240 0.2557];  
end  
  
function X = GuassElimination(n, A, B)  
X = zeros(n, 1);  
% Forward  
for k=1:n-1  
    for i=k+1:n  
        temp = A(i, k)/A(k,k);  
        A(i,k) = temp;  
        for j=k+1:n  
            A(i,j) = A(i,j) - (temp) * A(k,j);  
        end  
    end  
end
```

```

B(i) = B(i) - (temp) * B(k);
end
end
% Backward
sum = 0;
X(n) = B(n)/A(n,n);
for i=n-1:-1:1
sum = B(i);
for j=i+1:n
sum = sum - A(i,j) * X(j);
end
X(i) = sum/A(i,i);
end
end

```

### Sample run:

```

A =

    0.4096    0.1234    0.3678    0.2943
    0.2246    0.3872    0.4015    0.1129
    0.3345    0.1920    0.3781    0.0643
    0.1784    0.4002    0.2786    0.3927

B =

    0.4043    0.1550    0.4240    0.2557

ans =

    6.7831
    3.5914
   -6.4451
   -1.5179

```

### Explain:

The element's results are nearly all doubled. Comparing that to the solution of the original system, I find that the solution vector is non-uniformly scaled by some positive scaling factor greater than 1.

### Section 7.3: 1, 4, 6

1. Rewrite procedure Tri using only four arrays, (ai), (di), (ci), and (bi), and storing the solution in the (bi) array. Test the code with both a nonsymmetric and a symmetric tridiagonal system.

Answer:

$$\begin{bmatrix} d_1 & c_1 & & & & \\ a_1 & d_2 & c_2 & & & \\ & a_2 & d_3 & c_3 & & \\ & & \ddots & \ddots & \ddots & \\ & & & a_{i-1} & d_i & c_i \\ & & & & \ddots & \ddots & \ddots \\ & & & & & a_{n-2} & d_{n-1} & c_{n-1} \\ & & & & & a_{n-1} & d_n & \\ & & & & & & & \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ \vdots \\ x_i \\ \vdots \\ x_{n-1} \\ x_n \end{bmatrix} = \begin{bmatrix} b_1 \\ b_2 \\ b_3 \\ \vdots \\ b_i \\ \vdots \\ b_{n-1} \\ b_n \end{bmatrix}$$

```

procedure Tri(n, (ai), (di), (ci), (bi), (xi))
integer i, n; real xmult
real array (ai)1:n, (di)1:n, (ci)1:n, (bi)1:n, (xi)1:n
for i = 2 to n do
    xmult ← ai-1/di-1
    di ← di - (xmult)ci-1
    bi ← bi - (xmult)bi-1
end for
xn ← bn/dn
for i = n - 1 to 1 step -1 do
    xi ← (bi - cixi+1)/di
end for
end procedure Tri

```

**Code:**

```

clc;
% System symmetric
a1 = [-1 -1 -1];

d1 = [2.04 2.04 2.04 2.04];

c1 = [-1 -1 -1];

b1 = [40.8 0.8 0.8 200.8];

x1 = Tri( a1, d1, c1, b1 );

fprintf('The Solutions of the System symmetric: \n')

for i = 1: length(x1), fprintf('X1_%3.0f = %5.10f\n',i,x1(i)); end

% System nonsymmetric
a2 = [-1 -1 -1];

d2 = [2.04 2.04 2.04 2.04];

c2 = [1 1 1];

b2 = [40.8 0.8 0.8 200.8];
x2 = Tri( a2, d2, c2, b2 );

fprintf('\nThe Solutions of the System nonsymmetric: \n')

for i = 1: length(x2), fprintf('X2_%3.0f = %5.10f\n',i,x2(i)); end

```

```

function x = Tri( a, d, c, b )

n = length(b);

for i = 2: 1 : n

xmuilt = a(i-1)/d(i-1);

d(i) = d(i) - xmuilt*c(i-1);

b(i) = b(i) - xmuilt*b(i-1);

end

x(n) = b(n)/d(n);

for i = n-1: -1: 1

x(i) = (b(i) - c(i)*x(i+1))/d(i);

end

end

```

#### Sample Run:

```

The Solutions of the System symmetric:
X1_ 1 = 65.9698343668
X1_ 2 = 93.7784621082
X1_ 3 = 124.5382283340
X1_ 4 = 159.4795236931

The Solutions of the System nonsymmetric:
X2_ 1 = 10.0489507717
X2_ 2 = 20.3001404257
X2_ 3 = -30.5633356966
X2_ 4 = 83.4493452468

```

4. Use procedure Tri to solve the following system of 100 equations. Compare the numerical solution to the obvious exact solution.

Answer:

#### Code

```

clc;

N = 100;

a(1:N-1) = 0.5;

d(1:N) = 1;

c(1:N-1) = 0.5;

```

```

b(1) = 1.5; b(2:N) = 2; b(N) = 1.5;

x = Tri( a, d, c, b );

fprintf('The Solutions of the System: \n')

for i = 1: length(x), fprintf('X_%3.0f = %5.10f\n',i,x(i)); end


function x = Tri( a, d, c, b )

n = length(b);

for i = 2: 1 : n

xmult = a(i-1)/d(i-1);

d(i) = d(i) - xmult*c(i-1);

b(i) = b(i) - xmult*b(i-1);

end

x(n) = b(n)/d(n);

for i = n-1: -1: 1

x(i) = (b(i) - c(i)*x(i+1))/d(i);

end

end

```

### Sample Run:

```

The Solutions of the System:
X_  1 = 1.0000000000
X_  2 = 1.0000000000
X_  3 = 1.0000000000
X_  4 = 1.0000000000
X_  5 = 1.0000000000
X_  6 = 1.0000000000
X_  7 = 1.0000000000
X_  8 = 1.0000000000
X_  9 = 1.0000000000
X_ 10 = 1.0000000000
X_ 11 = 1.0000000000
X_ 12 = 1.0000000000
X_ 13 = 1.0000000000
X_ 14 = 1.0000000000
X_ 15 = 1.0000000000

```



X\_16 = 1.0000000000  
X\_17 = 1.0000000000  
X\_18 = 1.0000000000  
X\_19 = 1.0000000000  
X\_20 = 1.0000000000  
X\_21 = 1.0000000000  
X\_22 = 1.0000000000  
X\_23 = 1.0000000000  
X\_24 = 1.0000000000  
X\_25 = 1.0000000000  
X\_26 = 1.0000000000  
X\_27 = 1.0000000000  
X\_28 = 1.0000000000  
X\_29 = 1.0000000000  
X\_30 = 1.0000000000  
X\_31 = 1.0000000000  
X\_32 = 1.0000000000  
X\_33 = 1.0000000000  
X\_34 = 1.0000000000  
X\_35 = 1.0000000000  
X\_36 = 1.0000000000  
X\_37 = 1.0000000000  
X\_38 = 1.0000000000  
X\_39 = 1.0000000000  
X\_40 = 1.0000000000  
X\_41 = 1.0000000000  
X\_42 = 1.0000000000  
X\_43 = 1.0000000000  
X\_44 = 1.0000000000  
X\_45 = 1.0000000000  
X\_46 = 1.0000000000  
X\_47 = 1.0000000000  
X\_48 = 1.0000000000  
X\_49 = 1.0000000000  
X\_50 = 1.0000000000  
X\_51 = 1.0000000000  
X\_52 = 1.0000000000  
X\_53 = 1.0000000000  
X\_54 = 1.0000000000  
X\_55 = 1.0000000000  
X\_56 = 1.0000000000  
X\_57 = 1.0000000000  
X\_58 = 1.0000000000  
X\_59 = 1.0000000000  
X\_60 = 1.0000000000  
X\_61 = 1.0000000000  
X\_62 = 1.0000000000  
X\_63 = 1.0000000000  
X\_64 = 1.0000000000  
X\_65 = 1.0000000000  
X\_66 = 1.0000000000  
X\_67 = 1.0000000000  
X\_68 = 1.0000000000  
X\_69 = 1.0000000000

```

X_ 70 = 1.0000000000
X_ 71 = 1.0000000000
X_ 72 = 1.0000000000
X_ 73 = 1.0000000000
X_ 74 = 1.0000000000
X_ 75 = 1.0000000000
X_ 76 = 1.0000000000
X_ 77 = 1.0000000000
X_ 78 = 1.0000000000
X_ 79 = 1.0000000000
X_ 80 = 1.0000000000
X_ 81 = 1.0000000000
X_ 82 = 1.0000000000
X_ 83 = 1.0000000000
X_ 84 = 1.0000000000
X_ 85 = 1.0000000000
X_ 86 = 1.0000000000
X_ 87 = 1.0000000000
X_ 88 = 1.0000000000
X_ 89 = 1.0000000000
X_ 90 = 1.0000000000
X_ 91 = 1.0000000000
X_ 92 = 1.0000000000
X_ 93 = 1.0000000000
X_ 94 = 1.0000000000
X_ 95 = 1.0000000000
X_ 96 = 1.0000000000
X_ 97 = 1.0000000000
X_ 98 = 1.0000000000
X_ 99 = 1.0000000000
X_100 = 1.0000000000

```

6. Let A be the  $50 \times 50$  tridiagonal matrix

$$\begin{bmatrix} 5 & -1 & & & & \\ -1 & 5 & -1 & & & \\ & -1 & 5 & -1 & & \\ & & \ddots & \ddots & \ddots & \\ & & & -1 & 5 & -1 \\ & & & & -1 & 5 \end{bmatrix}$$

Consider the problem  $Ax = b$  for 50 different vectors  $b$  of the form

$$[1, 2, \dots, 49, 50]^T \quad [2, 3, \dots, 50, 1]^T \quad [3, 4, \dots, 50, 1, 2]^T \quad \dots$$

Consider the problem  $Ax = b$  for 50 different vectors  $b$  of the form.

Answer:

**Code:**

```

clc;
%Value of n
n = 50;
%create a diagonal
d = 5*ones(n, 1);
a = -1*ones(n, 1);
c = -1*ones(n, 1);
b = [1:n];

%Loop for different value of b
for i = 1:n
x = Tri( a, d, c, b);
fprintf('\nThe Solutions of the System: \n')
b
for i = 1: length(x), fprintf('X_%2.0f = %5.10f\n',i,x(i)); end
b = Shift_left(b);
end

%Tri function definition
function x = Tri( a, d, c, b )
n = length(b);
for i = 2: 1 : n
xmuilt = a(i-1)/d(i-1);
d(i) = d(i) - xmuilt*c(i-1);
b(i) = b(i) - xmuilt*b(i-1);
end
x(n) = b(n)/d(n);
for i = n-1: -1: 1
x(i) = (b(i) - c(i)*x(i+1))/d(i);
end
end

%Shift left function definition
function b = Shift_left(b)
n = length(b);
temp = b(1);
for i = 2:n
b(i-1) = b(i);
end
b(n) = temp;
end

```

### Sample Run:

The Solutions of the System:

b =

```

Columns 1 through 33
    1    2    3    4    5    6    7    8    9   10   11   12   13   14
15   16   17   18   19   20   21   22   23   24   25   26   27   28
29   30   31   32   33
Columns 34 through 50

```

	34	35	36	37	38	39	40	41	42	43	44	45	46	47
48	49	50												
X_1 = 0.3333333333														
X_2 = 0.6666666667														
X_3 = 1.0000000000														
X_4 = 1.3333333333														
X_5 = 1.6666666667														
X_6 = 2.0000000000														
X_7 = 2.3333333333														
X_8 = 2.6666666667														
X_9 = 3.0000000000														
X_10 = 3.3333333333														
X_11 = 3.6666666667														
X_12 = 4.0000000000														
X_13 = 4.3333333333														
X_14 = 4.6666666667														
X_15 = 5.0000000000														
X_16 = 5.3333333333														
X_17 = 5.6666666667														
X_18 = 6.0000000000														
X_19 = 6.3333333333														
X_20 = 6.6666666667														
X_21 = 7.0000000000														
X_22 = 7.3333333333														
X_23 = 7.6666666667														
X_24 = 8.0000000000														
X_25 = 8.3333333333														
X_26 = 8.6666666667														
X_27 = 9.0000000000														
X_28 = 9.3333333333														
X_29 = 9.6666666667														
X_30 = 10.0000000000														
X_31 = 10.3333333333														
X_32 = 10.6666666667														
X_33 = 11.0000000000														
X_34 = 11.3333333333														
X_35 = 11.6666666664														
X_36 = 11.9999999989														
X_37 = 12.3333333283														
X_38 = 12.6666666424														
X_39 = 12.9999998838														
X_40 = 13.3333327768														
X_41 = 13.6666640003														
X_42 = 13.9999872245														
X_43 = 14.3332721221														
X_44 = 14.6663733862														
X_45 = 14.9985948090														
X_46 = 15.3266006590														
X_47 = 15.6344084860														
X_48 = 15.8454417710														
X_49 = 15.5928003690														
X_50 = 13.1185600738														

The Solutions of the System:

```

b =
  Columns 1 through 33
      2      3      4      5      6      7      8      9     10     11     12     13     14     15
16     17     18     19     20     21     22     23     24     25     26     27     28     29
30     31     32     33     34
  Columns 34 through 50
      35     36     37     38     39     40     41     42     43     44     45     46     47     48
49     50      1
X_ 1 = 0.5970959492
X_ 2 = 0.9854797458
X_ 3 = 1.3303027798
X_ 4 = 1.6660341533
X_ 5 = 1.9998679868
X_ 6 = 2.3333057806
X_ 7 = 2.6666609161
X_ 8 = 2.9999987998
X_ 9 = 3.3333330828
X_10 = 3.6666666144
X_11 = 3.9999999891
X_12 = 4.3333333311
X_13 = 4.6666666662
X_14 = 4.9999999999
X_15 = 5.3333333333
X_16 = 5.6666666667
X_17 = 6.0000000000
X_18 = 6.3333333333
X_19 = 6.6666666667
X_20 = 7.0000000000
X_21 = 7.3333333333
X_22 = 7.6666666667
X_23 = 8.0000000000
X_24 = 8.3333333333
X_25 = 8.6666666667
X_26 = 9.0000000000
X_27 = 9.3333333333
X_28 = 9.6666666667
X_29 = 10.0000000000
X_30 = 10.3333333333
X_31 = 10.6666666667
X_32 = 11.0000000000
X_33 = 11.3333333333
X_34 = 11.6666666665
X_35 = 11.9999999991
X_36 = 12.3333333292
X_37 = 12.6666666466
X_38 = 12.9999999040
X_39 = 13.3333328733
X_40 = 13.6666644624
X_41 = 13.9999894389
X_42 = 14.3332827323
X_43 = 14.6664242223
X_44 = 14.9988383795
X_45 = 15.3277676751
X_46 = 15.6399999958

```

X\_47 = 15.8722323040  
 X\_48 = 15.7211615243  
 X\_49 = 13.7335753176  
 X\_50 = 2.9467150635

The Solutions of the System:

b =

Columns 1 through 33

	3	4	5	6	7	8	9	10	11	12	13	14	15	16
17	18	19	20	21	22	23	24	25	26	27	28	29	30	
31	32	33	34	35										

Columns 34 through 50

	36	37	38	39	40	41	42	43	44	45	46	47	48	49
50	1	2												

X\_1 = 0.8608585650  
 X\_2 = 1.3042928249  
 X\_3 = 1.6606055596  
 X\_4 = 1.9987349733  
 X\_5 = 2.3330693069  
 X\_6 = 2.6666115611  
 X\_7 = 2.9999884988  
 X\_8 = 3.3333309329  
 X\_9 = 3.6666661657  
 X\_10 = 3.999998954  
 X\_11 = 4.333333115  
 X\_12 = 4.6666666621  
 X\_13 = 4.999999990  
 X\_14 = 5.333333331  
 X\_15 = 5.666666666  
 X\_16 = 6.000000000  
 X\_17 = 6.333333333  
 X\_18 = 6.666666667  
 X\_19 = 7.000000000  
 X\_20 = 7.333333333  
 X\_21 = 7.666666667  
 X\_22 = 8.000000000  
 X\_23 = 8.333333333  
 X\_24 = 8.666666667  
 X\_25 = 9.000000000  
 X\_26 = 9.333333333  
 X\_27 = 9.666666667  
 X\_28 = 10.000000000  
 X\_29 = 10.333333333  
 X\_30 = 10.666666667  
 X\_31 = 11.000000000  
 X\_32 = 11.333333333  
 X\_33 = 11.666666665  
 X\_34 = 11.999999991  
 X\_35 = 12.3333333292  
 X\_36 = 12.6666666469  
 X\_37 = 12.9999999055  
 X\_38 = 13.3333328803  
 X\_39 = 13.6666644962  
 X\_40 = 13.9999896009

X\_41 = 14.3332835081  
 X\_42 = 14.6664279398  
 X\_43 = 14.9988561909  
 X\_44 = 15.3278530147  
 X\_45 = 15.6404088828  
 X\_46 = 15.8741913994  
 X\_47 = 15.7305481142  
 X\_48 = 13.7785491717  
 X\_49 = 3.1621977441  
 X\_50 = 1.0324395488

The Solutions of the System:

b =

Columns 1 through 33

	4	5	6	7	8	9	10	11	12	13	14	15	16	17
18	19	20	21	22	23	24	25	26	27	28	29	30	31	
32	33	34	35	36										

Columns 34 through 50

	37	38	39	40	41	42	43	44	45	46	47	48	49	50
--	----	----	----	----	----	----	----	----	----	----	----	----	----	----

1      2      3  
 X\_ 1 = 1.1246211808  
 X\_ 2 = 1.6231059041  
 X\_ 3 = 1.9909083395  
 X\_ 4 = 2.3314357933  
 X\_ 5 = 2.6662706270  
 X\_ 6 = 2.9999173417  
 X\_ 7 = 3.3333160815  
 X\_ 8 = 3.666630660  
 X\_ 9 = 3.9999992485  
 X\_10 = 4.3333331765  
 X\_11 = 4.666666339  
 X\_12 = 4.999999932  
 X\_13 = 5.333333319  
 X\_14 = 5.666666664  
 X\_15 = 5.999999999  
 X\_16 = 6.333333333  
 X\_17 = 6.666666667  
 X\_18 = 7.000000000  
 X\_19 = 7.333333333  
 X\_20 = 7.666666667  
 X\_21 = 8.000000000  
 X\_22 = 8.333333333  
 X\_23 = 8.666666667  
 X\_24 = 9.000000000  
 X\_25 = 9.333333333  
 X\_26 = 9.666666667  
 X\_27 = 10.000000000  
 X\_28 = 10.333333333  
 X\_29 = 10.666666667  
 X\_30 = 11.000000000  
 X\_31 = 11.333333333  
 X\_32 = 11.666666665  
 X\_33 = 11.999999991  
 X\_34 = 12.3333333292

```

X_35 = 12.6666666470
X_36 = 12.9999999057
X_37 = 13.3333328815
X_38 = 13.6666645020
X_39 = 13.9999896284
X_40 = 14.3332836401
X_41 = 14.6664285723
X_42 = 14.9988592213
X_43 = 15.3278675342
X_44 = 15.6404784496
X_45 = 15.8745247140
X_46 = 15.7321451202
X_47 = 13.7862008872
X_48 = 3.1988593156
X_49 = 1.2080956907
X_50 = 0.8416191381

```

The Solutions of the System:

b =

```

Columns 1 through 33
      5      6      7      8      9     10     11     12     13     14     15     16     17     18
19     20     21     22     23     24     25     26     27     28     29     30     31     32
33     34     35     36     37

```

```

Columns 34 through 50
      38     39     40     41     42     43     44     45     46     47     48     49     50      1
2       3       4

```

```

X_ 1 = 1.3883837966
X_ 2 = 1.9419189832
X_ 3 = 2.3212111193
X_ 4 = 2.6641366133
X_ 5 = 2.9994719471
X_ 6 = 3.3332231223
X_ 7 = 3.6666436643
X_ 8 = 3.9999951991
X_ 9 = 4.3333323313
X_10 = 4.6666664575
X_11 = 4.999999564
X_12 = 5.3333333242
X_13 = 5.6666666648
X_14 = 5.9999999996
X_15 = 6.3333333333
X_16 = 6.6666666666
X_17 = 7.0000000000
X_18 = 7.3333333333
X_19 = 7.6666666667
X_20 = 8.0000000000
X_21 = 8.3333333333
X_22 = 8.6666666667
X_23 = 9.0000000000
X_24 = 9.3333333333
X_25 = 9.6666666667
X_26 = 10.0000000000
X_27 = 10.3333333333
X_28 = 10.6666666667

```



```

X_29 = 11.0000000000
X_30 = 11.3333333333
X_31 = 11.6666666665
X_32 = 11.9999999991
X_33 = 12.3333333292
X_34 = 12.6666666470
X_35 = 12.9999999058
X_36 = 13.3333328818
X_37 = 13.6666645034
X_38 = 13.9999896353
X_39 = 14.3332836732
X_40 = 14.6664287308
X_41 = 14.9988599807
X_42 = 15.3278711727
X_43 = 15.6404958826
X_44 = 15.8746082406
X_45 = 15.7325453202
X_46 = 13.7881183604
X_47 = 3.2080464818
X_48 = 1.2521140484
X_49 = 1.0525237601
X_50 = 1.0105047520

```

The Solutions of the System:

b =

```

Columns 1 through 33
   6   7   8   9  10  11  12  13  14  15  16  17  18  19
20  21  22  23  24  25  26  27  28  29  30  31  32  33
34  35  36  37  38
Columns 34 through 50
  39  40  41  42  43  44  45  46  47  48  49  50   1   2
3    4    5

```

```

X_ 1 = 1.6521464125
X_ 2 = 2.2607320623
X_ 3 = 2.6515138991
X_ 4 = 2.9968374333
X_ 5 = 3.3326732672
X_ 6 = 3.6665289028
X_ 7 = 3.9999712470
X_ 8 = 4.3333273322
X_ 9 = 4.6666654142
X_10 = 4.9999997386
X_11 = 5.3333332788
X_12 = 5.6666666553
X_13 = 5.9999999976
X_14 = 6.3333333328
X_15 = 6.6666666666
X_16 = 7.0000000000
X_17 = 7.3333333333
X_18 = 7.6666666667
X_19 = 8.0000000000
X_20 = 8.3333333333
X_21 = 8.6666666667
X_22 = 9.0000000000

```

```

X_23 = 9.3333333333
X_24 = 9.6666666667
X_25 = 10.0000000000
X_26 = 10.3333333333
X_27 = 10.6666666667
X_28 = 11.0000000000
X_29 = 11.3333333333
X_30 = 11.6666666665
X_31 = 11.9999999991
X_32 = 12.3333333292
X_33 = 12.6666666470
X_34 = 12.9999999058
X_35 = 13.3333328819
X_36 = 13.6666645038
X_37 = 13.9999896371
X_38 = 14.3332836818
X_39 = 14.6664287718
X_40 = 14.9988601774
X_41 = 15.3278721154
X_42 = 15.6405003995
X_43 = 15.8746298823
X_44 = 15.7326490122
X_45 = 13.7886151784
X_46 = 3.2104268800
X_47 = 1.2635192218
X_48 = 1.1071692289
X_49 = 1.2723269227
X_50 = 1.2544653845

```

The Solutions of the System:

b =

Columns 1 through 33

	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	
35	36	37	38	39										

Columns 34 through 50

	40	41	42	43	44	45	46	47	48	49	50	1	2	3
4	5	6												

```

X_ 1 = 1.9159090283
X_ 2 = 2.5795451414
X_ 3 = 2.9818166789
X_ 4 = 3.3295382533
X_ 5 = 3.6658745873
X_ 6 = 3.9998346834
X_ 7 = 4.3332988298
X_ 8 = 4.666594654
X_ 9 = 4.9999984970
X_10 = 5.3333330196
X_11 = 5.666666012
X_12 = 5.9999999863
X_13 = 6.3333333305
X_14 = 6.666666661
X_15 = 6.999999999
X_16 = 7.333333333

```

```

X_17 = 7.6666666667
X_18 = 8.0000000000
X_19 = 8.3333333333
X_20 = 8.6666666667
X_21 = 9.0000000000
X_22 = 9.3333333333
X_23 = 9.6666666667
X_24 = 10.0000000000
X_25 = 10.3333333333
X_26 = 10.6666666667
X_27 = 11.0000000000
X_28 = 11.3333333333
X_29 = 11.6666666665
X_30 = 11.9999999991
X_31 = 12.3333333292
X_32 = 12.6666666470
X_33 = 12.9999999058
X_34 = 13.3333328819
X_35 = 13.6666645039
X_36 = 13.9999896376
X_37 = 14.3332836840
X_38 = 14.6664287822
X_39 = 14.9988602270
X_40 = 15.3278723529
X_41 = 15.6405015374
X_42 = 15.8746353341
X_43 = 15.7326751330
X_44 = 13.7887403310
X_45 = 3.2110265218
X_46 = 1.2663922778
X_47 = 1.1209348674
X_48 = 1.3382820593
X_49 = 1.5704754290
X_50 = 1.5140950858

```

The Solutions of the System:

b =

```

Columns 1 through 33
      8      9      10      11      12      13      14      15      16      17      18      19      20      21
22      23      24      25      26      27      28      29      30      31      32      33      34      35
36      37      38      39      40
Columns 34 through 50
      41      42      43      44      45      46      47      48      49      50      1      2      3      4
5      6      7
X_ 1 = 2.1796716441
X_ 2 = 2.8983582206
X_ 3 = 3.3121194588
X_ 4 = 3.6622390732
X_ 5 = 3.9990759074
X_ 6 = 4.3331404640
X_ 7 = 4.6666264125
X_ 8 = 4.9999915985
X_ 9 = 5.3333315798
X_10 = 5.6666663007
X_11 = 5.9999999236

```

```

X_12 = 6.3333333174
X_13 = 6.6666666633
X_14 = 6.9999999993
X_15 = 7.3333333332
X_16 = 7.6666666666
X_17 = 8.0000000000
X_18 = 8.3333333333
X_19 = 8.6666666667
X_20 = 9.0000000000
X_21 = 9.3333333333
X_22 = 9.6666666667
X_23 = 10.0000000000
X_24 = 10.3333333333
X_25 = 10.6666666667
X_26 = 11.0000000000
X_27 = 11.3333333333
X_28 = 11.6666666665
X_29 = 11.9999999991
X_30 = 12.3333333292
X_31 = 12.6666666470
X_32 = 12.9999999058
X_33 = 13.3333328819
X_34 = 13.6666645039
X_35 = 13.9999896377
X_36 = 14.3332836845
X_37 = 14.6664287847
X_38 = 14.9988602392
X_39 = 15.3278724111
X_40 = 15.6405018161
X_41 = 15.8746366695
X_42 = 15.7326815314
X_43 = 13.7887709873
X_44 = 3.2111734051
X_45 = 1.2670960384
X_46 = 1.1243067868
X_47 = 1.3544378956
X_48 = 1.6478826913
X_49 = 1.8849755607
X_50 = 1.7769951121

```

The Solutions of the System:

b =

```

Columns 1 through 33
   9   10   11   12   13   14   15   16   17   18   19   20   21   22
23   24   25   26   27   28   29   30   31   32   33   34   35   36
37   38   39   40   41
Columns 34 through 50
  42   43   44   45   46   47   48   49   50   1   2   3   4   5
6    7    8
X_ 1 = 2.4434342599
X_ 2 = 3.2171712997
X_ 3 = 3.6424222386
X_ 4 = 3.9949398932
X_ 5 = 4.3322772276

```

X\_ 6 = 4.6664462446  
 X\_ 7 = 4.9999539952  
 X\_ 8 = 5.3333237316  
 X\_ 9 = 5.6666646627  
 X\_10 = 5.9999995817  
 X\_11 = 6.3333332460  
 X\_12 = 6.6666666484  
 X\_13 = 6.9999999962  
 X\_14 = 7.3333333325  
 X\_15 = 7.6666666665  
 X\_16 = 8.0000000000  
 X\_17 = 8.3333333333  
 X\_18 = 8.6666666667  
 X\_19 = 9.0000000000  
 X\_20 = 9.3333333333  
 X\_21 = 9.6666666667  
 X\_22 = 10.0000000000  
 X\_23 = 10.3333333333  
 X\_24 = 10.6666666667  
 X\_25 = 11.0000000000  
 X\_26 = 11.3333333333  
 X\_27 = 11.6666666665  
 X\_28 = 11.9999999991  
 X\_29 = 12.3333333292  
 X\_30 = 12.6666666470  
 X\_31 = 12.9999999058  
 X\_32 = 13.3333328819  
 X\_33 = 13.6666645039  
 X\_34 = 13.9999896377  
 X\_35 = 14.3332836846  
 X\_36 = 14.6664287853  
 X\_37 = 14.9988602421  
 X\_38 = 15.3278724250  
 X\_39 = 15.6405018829  
 X\_40 = 15.8746369896  
 X\_41 = 15.7326830649  
 X\_42 = 13.7887783347  
 X\_43 = 3.2112086088  
 X\_44 = 1.2672647091  
 X\_45 = 1.1251149365  
 X\_46 = 1.3583099735  
 X\_47 = 1.6664349309  
 X\_48 = 1.9738646812  
 X\_49 = 2.2028884753  
 X\_50 = 2.0405776951

The Solutions of the System:

b =

Columns 1 through 33														
	10	11	12	13	14	15	16	17	18	19	20	21	22	23
24	25	26	27	28	29	30	31	32	33	34	35	36	37	
38	39	40	41	42										
Columns 34 through 50														
	43	44	45	46	47	48	49	50	1	2	3	4	5	6

7	8	9
X_1	=	2.7071968758
X_2	=	3.5359843788
X_3	=	3.9727250184
X_4	=	4.3276407132
X_5	=	4.6654785477
X_6	=	4.9997520251
X_7	=	5.3332815780
X_8	=	5.6666558647
X_9	=	5.9999977455
X_10	=	6.3333328628
X_11	=	6.6666665685
X_12	=	6.9999999795
X_13	=	7.3333333291
X_14	=	7.6666666658
X_15	=	7.9999999998
X_16	=	8.3333333333
X_17	=	8.6666666667
X_18	=	9.0000000000
X_19	=	9.3333333333
X_20	=	9.6666666667
X_21	=	10.0000000000
X_22	=	10.3333333333
X_23	=	10.6666666667
X_24	=	11.0000000000
X_25	=	11.3333333333
X_26	=	11.6666666665
X_27	=	11.9999999991
X_28	=	12.3333333292
X_29	=	12.6666666470
X_30	=	12.9999999058
X_31	=	13.3333328819
X_32	=	13.6666645039
X_33	=	13.9999896377
X_34	=	14.3332836846
X_35	=	14.6664287855
X_36	=	14.9988602428
X_37	=	15.3278724283
X_38	=	15.6405018987
X_39	=	15.8746370650
X_40	=	15.7326834263
X_41	=	13.7887800664
X_42	=	3.2112169058
X_43	=	1.2673044624
X_44	=	1.1253054062
X_45	=	1.3592225688
X_46	=	1.6708074377
X_47	=	1.9948146195
X_48	=	2.3032656597
X_49	=	2.5215136791
X_50	=	2.3043027358

The Solutions of the System:  
b =

Columns 1 through 33														
	11	12	13	14	15	16	17	18	19	20	21	22	23	24
25	26	27	28	29	30	31	32	33	34	35	36	37	38	
39	40	41	42	43										

Columns 34 through 50														
	44	45	46	47	48	49	50	1	2	3	4	5	6	7

8	9	10
X_1 = 2.9709594916		
X_2 = 3.8547974580		
X_3 = 4.3030277982		
X_4 = 4.6603415332		
X_5 = 4.9986798678		
X_6 = 5.3330578057		
X_7 = 5.6666091607		
X_8 = 5.9999879978		
X_9 = 6.3333308283		
X_10 = 6.6666661438		
X_11 = 6.999998909		
X_12 = 7.3333333106		
X_13 = 7.6666666619		
X_14 = 7.9999999990		
X_15 = 8.3333333331		
X_16 = 8.6666666666		
X_17 = 9.0000000000		
X_18 = 9.3333333333		
X_19 = 9.6666666667		
X_20 = 10.0000000000		
X_21 = 10.3333333333		
X_22 = 10.6666666667		
X_23 = 11.0000000000		
X_24 = 11.3333333333		
X_25 = 11.6666666665		
X_26 = 11.9999999991		
X_27 = 12.3333333292		
X_28 = 12.6666666470		
X_29 = 12.9999999058		
X_30 = 13.3333328819		
X_31 = 13.6666645039		
X_32 = 13.9999896377		
X_33 = 14.3332836846		
X_34 = 14.6664287855		
X_35 = 14.9988602429		
X_36 = 15.3278724290		
X_37 = 15.6405019023		
X_38 = 15.8746370825		
X_39 = 15.7326835103		
X_40 = 13.7887804692		
X_41 = 3.2112188357		
X_42 = 1.2673137091		
X_43 = 1.1253497098		
X_44 = 1.3594348400		
X_45 = 1.6718244903		
X_46 = 1.9996876114		
X_47 = 2.3266135668		

X\_48 = 2.6333802226  
X\_49 = 2.8402875464  
X\_50 = 2.5680575093

The Solutions of the System:

b =

Columns 1 through 33  
12 13 14 15 16 17 18 19 20 21 22 23 24 25  
26 27 28 29 30 31 32 33 34 35 36 37 38 39  
40 41 42 43 44

Columns 34 through 50  
45 46 47 48 49 50 1 2 3 4 5 6 7 8  
9 10 11

X\_1 = 3.2347221074  
X\_2 = 4.1736105371  
X\_3 = 4.6333305781  
X\_4 = 4.9930423532  
X\_5 = 5.3318811879  
X\_6 = 5.6663635863  
X\_7 = 5.9999367434  
X\_8 = 6.3333201309  
X\_9 = 6.666639112  
X\_10 = 6.999994249  
X\_11 = 7.333332133  
X\_12 = 7.666666416  
X\_13 = 7.999999948  
X\_14 = 8.333333322  
X\_15 = 8.666666664  
X\_16 = 9.000000000  
X\_17 = 9.333333333  
X\_18 = 9.666666667  
X\_19 = 10.000000000  
X\_20 = 10.333333333  
X\_21 = 10.666666667  
X\_22 = 11.000000000  
X\_23 = 11.333333333  
X\_24 = 11.666666665  
X\_25 = 11.999999991  
X\_26 = 12.3333333292  
X\_27 = 12.6666666470  
X\_28 = 12.9999999058  
X\_29 = 13.3333328819  
X\_30 = 13.6666645039  
X\_31 = 13.9999896377  
X\_32 = 14.3332836846  
X\_33 = 14.6664287855  
X\_34 = 14.9988602429  
X\_35 = 15.3278724292  
X\_36 = 15.6405019032  
X\_37 = 15.8746370866  
X\_38 = 15.7326835297  
X\_39 = 13.7887805619  
X\_40 = 3.2112192798  
X\_41 = 1.2673158372



```

X_42 = 1.1253599062
X_43 = 1.3594836940
X_44 = 1.6720585636
X_45 = 2.0008091239
X_46 = 2.3319870558
X_47 = 2.6591261550
X_48 = 2.9636437193
X_49 = 3.1590924415
X_50 = 2.8318184883

```

The Solutions of the System:

b =

```

Columns 1 through 33
    13    14    15    16    17    18    19    20    21    22    23    24    25    26
27    28    29    30    31    32    33    34    35    36    37    38    39    40
41    42    43    44    45
Columns 34 through 50
    46    47    48    49    50     1     2     3     4     5     6     7     8     9

```

```

10    11    12
X_ 1 = 3.4984847232
X_ 2 = 4.4924236162
X_ 3 = 4.9636333579
X_ 4 = 5.3257431732
X_ 5 = 5.6650825080
X_ 6 = 5.9996693668
X_ 7 = 6.3332643262
X_ 8 = 6.666522640
X_ 9 = 6.9999969940
X_10 = 7.3333327059
X_11 = 7.666665357
X_12 = 7.999999727
X_13 = 8.333333276
X_14 = 8.666666655
X_15 = 8.999999998
X_16 = 9.333333333
X_17 = 9.666666667
X_18 = 10.000000000
X_19 = 10.333333333
X_20 = 10.666666667
X_21 = 11.000000000
X_22 = 11.333333333
X_23 = 11.666666665
X_24 = 11.999999991
X_25 = 12.333333329
X_26 = 12.666666647
X_27 = 12.999999905
X_28 = 13.333332881
X_29 = 13.666664503
X_30 = 13.999989637
X_31 = 14.333283684
X_32 = 14.666428785
X_33 = 14.998860243
X_34 = 15.327872429
X_35 = 15.640501903

```

```

X_36 = 15.8746370875
X_37 = 15.7326835341
X_38 = 13.7887805831
X_39 = 3.2112193812
X_40 = 1.2673163227
X_41 = 1.1253622326
X_42 = 1.3594948401
X_43 = 1.6721119679
X_44 = 2.0010649993
X_45 = 2.3332130285
X_46 = 2.6650001435
X_47 = 2.9917876887
X_48 = 3.2939383003
X_49 = 3.4779038126
X_50 = 3.0955807625

```

The Solutions of the System:

b =

```

Columns 1 through 33
    14    15    16    17    18    19    20    21    22    23    24    25    26    27
28    29    30    31    32    33    34    35    36    37    38    39    40    41
42    43    44    45    46

```

```

Columns 34 through 50
    47    48    49    50     1     2     3     4     5     6     7     8     9    10
11    12    13

```

```

X_ 1 = 3.7622473391
X_ 2 = 4.8112366954
X_ 3 = 5.2939361377
X_ 4 = 5.6584439932
X_ 5 = 5.9982838281
X_ 6 = 6.3329751474
X_ 7 = 6.6665919089
X_ 8 = 6.9999843971
X_ 9 = 7.3333300768
X_10 = 7.6666659870
X_11 = 7.9999998581
X_12 = 8.3333333037
X_13 = 8.6666666605
X_14 = 8.9999999987
X_15 = 9.3333333331
X_16 = 9.6666666666
X_17 = 10.0000000000
X_18 = 10.3333333333
X_19 = 10.6666666667
X_20 = 11.0000000000
X_21 = 11.3333333333
X_22 = 11.6666666665
X_23 = 11.9999999991
X_24 = 12.3333333292
X_25 = 12.6666666470
X_26 = 12.9999999058
X_27 = 13.3333328819
X_28 = 13.6666645039
X_29 = 13.9999896377

```

X\_30 = 14.3332836846  
 X\_31 = 14.6664287855  
 X\_32 = 14.9988602430  
 X\_33 = 15.3278724293  
 X\_34 = 15.6405019034  
 X\_35 = 15.8746370877  
 X\_36 = 15.7326835351  
 X\_37 = 13.7887805878  
 X\_38 = 3.2112194041  
 X\_39 = 1.2673164327  
 X\_40 = 1.1253627595  
 X\_41 = 1.3594973646  
 X\_42 = 1.6721240637  
 X\_43 = 2.0011229540  
 X\_44 = 2.3334907061  
 X\_45 = 2.6663305767  
 X\_46 = 2.9981621772  
 X\_47 = 3.3244803092  
 X\_48 = 3.6242393689  
 X\_49 = 3.7967165352  
 X\_50 = 3.3593433070

The Solutions of the System:

b =

Columns 1 through 33

	15	16	17	18	19	20	21	22	23	24	25	26	27	28
29	30	31	32	33	34	35	36	37	38	39	40	41	42	
43	44	45	46	47										

Columns 34 through 50

	48	49	50	1	2	3	4	5	6	7	8	9	10	11
12	13	14												

X\_1 = 4.0260099549  
 X\_2 = 5.1300497745  
 X\_3 = 5.6242389175  
 X\_4 = 5.9911448132  
 X\_5 = 6.3314851482  
 X\_6 = 6.6662809280  
 X\_7 = 6.9999194916  
 X\_8 = 7.3333165303  
 X\_9 = 7.6666631597  
 X\_10 = 7.9999992680  
 X\_11 = 8.3333331806  
 X\_12 = 8.6666666348  
 X\_13 = 8.9999999933  
 X\_14 = 9.3333333319  
 X\_15 = 9.6666666664  
 X\_16 = 9.9999999999  
 X\_17 = 10.3333333333  
 X\_18 = 10.6666666667  
 X\_19 = 11.0000000000  
 X\_20 = 11.3333333333  
 X\_21 = 11.6666666665  
 X\_22 = 11.9999999991  
 X\_23 = 12.3333333292

```

X_24 = 12.6666666470
X_25 = 12.9999999058
X_26 = 13.3333328819
X_27 = 13.6666645039
X_28 = 13.9999896377
X_29 = 14.3332836846
X_30 = 14.6664287855
X_31 = 14.9988602430
X_32 = 15.3278724293
X_33 = 15.6405019034
X_34 = 15.8746370877
X_35 = 15.7326835353
X_36 = 13.7887805889
X_37 = 3.2112194093
X_38 = 1.2673164575
X_39 = 1.1253628781
X_40 = 1.3594979329
X_41 = 1.6721267865
X_42 = 2.0011359995
X_43 = 2.3335532112
X_44 = 2.6666300564
X_45 = 2.9995970708
X_46 = 3.3313552977
X_47 = 3.6571794179
X_48 = 3.9545417916
X_49 = 4.1155295399
X_50 = 3.6231059080

```

The Solutions of the System:

b =

Columns 1 through 33

	16	17	18	19	20	21	22	23	24	25	26	27	28	29
30	31	32	33	34	35	36	37	38	39	40	41	42	43	
44	45	46	47	48										

Columns 34 through 50

	49	50	1	2	3	4	5	6	7	8	9	10	11	12
13	14	15												

```

X_ 1 = 4.2897725707
X_ 2 = 5.4488628536
X_ 3 = 5.9545416974
X_ 4 = 6.3238456331
X_ 5 = 6.6646864683
X_ 6 = 6.9995867085
X_ 7 = 7.3332470744
X_ 8 = 7.6666486634
X_ 9 = 7.9999962425
X_10 = 8.3333325491
X_11 = 8.6666665030
X_12 = 8.9999999658
X_13 = 9.3333333262
X_14 = 9.6666666652
X_15 = 9.9999999997
X_16 = 10.3333333333
X_17 = 10.6666666667

```

```

X_18 = 11.0000000000
X_19 = 11.3333333333
X_20 = 11.6666666665
X_21 = 11.9999999991
X_22 = 12.3333333292
X_23 = 12.6666666470
X_24 = 12.9999999058
X_25 = 13.3333328819
X_26 = 13.6666645039
X_27 = 13.9999896377
X_28 = 14.3332836846
X_29 = 14.6664287855
X_30 = 14.9988602430
X_31 = 15.3278724293
X_32 = 15.6405019034
X_33 = 15.8746370878
X_34 = 15.7326835354
X_35 = 13.7887805892
X_36 = 3.2112194104
X_37 = 1.2673164630
X_38 = 1.1253629046
X_39 = 1.3594980602
X_40 = 1.6721273961
X_41 = 2.0011389205
X_42 = 2.3335672065
X_43 = 2.666971118
X_44 = 2.9999183527
X_45 = 3.3328946518
X_46 = 3.6645549065
X_47 = 3.9898798807
X_48 = 4.2848444968
X_49 = 4.4343426035
X_50 = 3.8868685207

```

The Solutions of the System:

b =

```

Columns 1 through 33
  17   18   19   20   21   22   23   24   25   26   27   28   29   30
31   32   33   34   35   36   37   38   39   40   41   42   43   44
45   46   47   48   49
Columns 34 through 50
  50    1    2    3    4    5    6    7    8    9   10   11   12   13
14   15   16
X_ 1 = 4.5535351865
X_ 2 = 5.7676759327
X_ 3 = 6.2848444772
X_ 4 = 6.6565464531
X_ 5 = 6.9978877884
X_ 6 = 7.3328924891
X_ 7 = 7.6665746571
X_ 8 = 7.9999807965
X_ 9 = 8.3333293253
X_10 = 8.666658301
X_11 = 8.999998254

```

```

X_12 = 9.3333332969
X_13 = 9.6666666591
X_14 = 9.9999999984
X_15 = 10.3333333330
X_16 = 10.6666666666
X_17 = 11.0000000000
X_18 = 11.3333333333
X_19 = 11.6666666665
X_20 = 11.9999999991
X_21 = 12.3333333292
X_22 = 12.6666666470
X_23 = 12.9999999058
X_24 = 13.3333328819
X_25 = 13.6666645039
X_26 = 13.9999896377
X_27 = 14.3332836846
X_28 = 14.6664287855
X_29 = 14.9988602430
X_30 = 15.3278724293
X_31 = 15.6405019034
X_32 = 15.8746370878
X_33 = 15.7326835354
X_34 = 13.7887805892
X_35 = 3.2112194107
X_36 = 1.2673164642
X_37 = 1.1253629106
X_38 = 1.3594980885
X_39 = 1.6721275320
X_40 = 2.0011395715
X_41 = 2.3335703257
X_42 = 2.6667120568
X_43 = 2.9999899586
X_44 = 3.3332377359
X_45 = 3.6661987211
X_46 = 3.9977558694
X_47 = 4.3225806261
X_48 = 4.6151472611
X_49 = 4.7531556794
X_50 = 4.1506311359

```

The Solutions of the System:

b =

```

Columns 1 through 33
  18   19   20   21   22   23   24   25   26   27   28   29   30   31
32   33   34   35   36   37   38   39   40   41   42   43   44   45
46   47   48   49   50
Columns 34 through 50
  1    2    3    4    5    6    7    8    9   10   11   12   13   14
15   16   17
X_ 1 = 4.8172978024
X_ 2 = 6.0864890119
X_ 3 = 6.6151472570
X_ 4 = 6.9892472731
X_ 5 = 7.3310891086

```

$X_6 = 7.6661982697$   
 $X_7 = 7.9999022399$   
 $X_8 = 8.3333129296$   
 $X_9 = 8.666624082$   
 $X_{10} = 8.999991112$   
 $X_{11} = 9.3333331478$   
 $X_{12} = 9.666666279$   
 $X_{13} = 9.999999919$   
 $X_{14} = 10.3333333316$   
 $X_{15} = 10.666666663$   
 $X_{16} = 10.999999999$   
 $X_{17} = 11.333333333$   
 $X_{18} = 11.666666665$   
 $X_{19} = 11.999999991$   
 $X_{20} = 12.3333333292$   
 $X_{21} = 12.6666666470$   
 $X_{22} = 12.9999999058$   
 $X_{23} = 13.3333328819$   
 $X_{24} = 13.6666645039$   
 $X_{25} = 13.9999896377$   
 $X_{26} = 14.3332836846$   
 $X_{27} = 14.6664287855$   
 $X_{28} = 14.9988602430$   
 $X_{29} = 15.3278724293$   
 $X_{30} = 15.6405019034$   
 $X_{31} = 15.8746370878$   
 $X_{32} = 15.7326835354$   
 $X_{33} = 13.7887805892$   
 $X_{34} = 3.2112194108$   
 $X_{35} = 1.2673164645$   
 $X_{36} = 1.1253629119$   
 $X_{37} = 1.3594980948$   
 $X_{38} = 1.6721275622$   
 $X_{39} = 2.0011397160$   
 $X_{40} = 2.3335710181$   
 $X_{41} = 2.6667153743$   
 $X_{42} = 3.0000058533$   
 $X_{43} = 3.3333138921$   
 $X_{44} = 3.6665636073$   
 $X_{45} = 3.9995041445$   
 $X_{46} = 4.3309571150$   
 $X_{47} = 4.6552814305$   
 $X_{48} = 4.9454500377$   
 $X_{49} = 5.0719687578$   
 $X_{50} = 4.4143937516$

The Solutions of the System:

b =

Columns 1 through 33													
19	20	21	22	23	24	25	26	27	28	29	30	31	32
33	34	35	36	37	38	39	40	41	42	43	44	45	46
47	48	49	50	1									
Columns 34 through 50													
2	3	4	5	6	7	8	9	10	11	12	13	14	15

16	17	18
X_1	=	5.0810604182
X_2	=	6.4053020910
X_3	=	6.9454500368
X_4	=	7.3219480931
X_5	=	7.6642904287
X_6	=	7.9995040503
X_7	=	8.3332298226
X_8	=	8.666450627
X_9	=	8.999954910
X_10	=	9.3333323922
X_11	=	9.666664703
X_12	=	9.999999590
X_13	=	10.3333333248
X_14	=	10.666666649
X_15	=	10.999999996
X_16	=	11.3333333332
X_17	=	11.6666666665
X_18	=	11.9999999991
X_19	=	12.3333333292
X_20	=	12.6666666470
X_21	=	12.9999999058
X_22	=	13.3333328819
X_23	=	13.6666645039
X_24	=	13.9999896377
X_25	=	14.3332836846
X_26	=	14.6664287855
X_27	=	14.9988602430
X_28	=	15.3278724293
X_29	=	15.6405019034
X_30	=	15.8746370878
X_31	=	15.7326835354
X_32	=	13.7887805892
X_33	=	3.2112194108
X_34	=	1.2673164646
X_35	=	1.1253629122
X_36	=	1.3594980962
X_37	=	1.6721275688
X_38	=	2.0011397480
X_39	=	2.3335711712
X_40	=	2.6667161080
X_41	=	3.0000093689
X_42	=	3.3333307366
X_43	=	3.666443139
X_44	=	3.9998908329
X_45	=	4.3328098505
X_46	=	4.6641584196
X_47	=	4.9879822473
X_48	=	5.2757528168
X_49	=	5.3907818368
X_50	=	4.6781563674

The Solutions of the System:  
b =



Columns 1 through 33														
	20	21	22	23	24	25	26	27	28	29	30	31	32	33
34	35	36	37	38	39	40	41	42	43	44	45	46	47	
48	49	50	1	2										

Columns 34 through 50														
	3	4	5	6	7	8	9	10	11	12	13	14	15	16

17	18	19
X_1	=	5.3448230340
X_2	=	6.7241151701
X_3	=	7.2757528166
X_4	=	7.6546489131
X_5	=	7.9974917488
X_6	=	8.3328098308
X_7	=	8.6665574053
X_8	=	8.9999771958
X_9	=	9.3333285738
X_10	=	9.6666656733
X_11	=	9.999997927
X_12	=	10.3333332901
X_13	=	10.6666666576
X_14	=	10.9999999981
X_15	=	11.3333333329
X_16	=	11.6666666664
X_17	=	11.9999999991
X_18	=	12.3333333292
X_19	=	12.6666666470
X_20	=	12.9999999058
X_21	=	13.3333328819
X_22	=	13.6666645039
X_23	=	13.9999896377
X_24	=	14.3332836846
X_25	=	14.6664287855
X_26	=	14.9988602430
X_27	=	15.3278724293
X_28	=	15.6405019034
X_29	=	15.8746370878
X_30	=	15.7326835354
X_31	=	13.7887805892
X_32	=	3.2112194108
X_33	=	1.2673164646
X_34	=	1.1253629122
X_35	=	1.3594980965
X_36	=	1.6721275703
X_37	=	2.0011397551
X_38	=	2.3335712050
X_39	=	2.6667162698
X_40	=	3.0000101440
X_41	=	3.3333344504
X_42	=	3.6666621080
X_43	=	3.9999760898
X_44	=	4.3332183411
X_45	=	4.6661156155
X_46	=	4.9973597364
X_47	=	5.3206830666

$X_{48} = 5.6060555965$   
 $X_{49} = 5.7095949159$   
 $X_{50} = 4.9419189832$

The Solutions of the System:

b =

Columns 1 through 33

	21	22	23	24	25	26	27	28	29	30	31	32	33	34
35	36	37	38	39	40	41	42	43	44	45	46	47	48	
49	50	1	2	3										

Columns 34 through 50

	4	5	6	7	8	9	10	11	12	13	14	15	16	17
18	19	20												

$X_1 = 5.6085856499$   
 $X_2 = 7.0429282493$   
 $X_3 = 7.6060555965$   
 $X_4 = 7.9873497331$   
 $X_5 = 8.3306930689$   
 $X_6 = 8.6661156114$   
 $X_7 = 8.9998849881$   
 $X_8 = 9.3333093289$   
 $X_9 = 9.6666616567$   
 $X_{10} = 9.9999989544$   
 $X_{11} = 10.3333331151$   
 $X_{12} = 10.6666666211$   
 $X_{13} = 10.9999999905$   
 $X_{14} = 11.3333333313$   
 $X_{15} = 11.6666666661$   
 $X_{16} = 11.9999999991$   
 $X_{17} = 12.3333333292$   
 $X_{18} = 12.6666666470$   
 $X_{19} = 12.9999999058$   
 $X_{20} = 13.3333328819$   
 $X_{21} = 13.6666645039$   
 $X_{22} = 13.9999896377$   
 $X_{23} = 14.3332836846$   
 $X_{24} = 14.6664287855$   
 $X_{25} = 14.9988602430$   
 $X_{26} = 15.3278724293$   
 $X_{27} = 15.6405019034$   
 $X_{28} = 15.8746370878$   
 $X_{29} = 15.7326835354$   
 $X_{30} = 13.7887805892$   
 $X_{31} = 3.2112194108$   
 $X_{32} = 1.2673164646$   
 $X_{33} = 1.1253629122$   
 $X_{34} = 1.3594980966$   
 $X_{35} = 1.6721275706$   
 $X_{36} = 2.0011397566$   
 $X_{37} = 2.3335712124$   
 $X_{38} = 2.6667163054$   
 $X_{39} = 3.0000103145$   
 $X_{40} = 3.3333352669$   
 $X_{41} = 3.6666660201$

```

X_42 = 3.9999948337
X_43 = 4.3333081484
X_44 = 4.6665459082
X_45 = 4.9994213928
X_46 = 5.3305610558
X_47 = 5.6533838864
X_48 = 5.9363583763
X_49 = 6.0284079951
X_50 = 5.2056815990

```

The Solutions of the System:

b =

```

Columns 1 through 33
    22    23    24    25    26    27    28    29    30    31    32    33    34    35
36    37    38    39    40    41    42    43    44    45    46    47    48    49
50     1     2     3     4
Columns 34 through 50
     5     6     7     8     9    10    11    12    13    14    15    16    17    18
19    20    21

```

```

X_ 1 = 5.8723482657
X_ 2 = 7.3617413284
X_ 3 = 7.9363583763
X_ 4 = 8.3200505531
X_ 5 = 8.6638943890
X_ 6 = 8.9994213920
X_ 7 = 9.3332125708
X_ 8 = 9.6666414621
X_ 9 = 9.9999947395
X_10 = 10.3333322354
X_11 = 10.6666664375
X_12 = 10.9999999522
X_13 = 11.3333333233
X_14 = 11.6666666644
X_15 = 11.9999999987
X_16 = 12.3333333291
X_17 = 12.6666666470
X_18 = 12.9999999058
X_19 = 13.3333328819
X_20 = 13.6666645039
X_21 = 13.9999896377
X_22 = 14.3332836846
X_23 = 14.6664287855
X_24 = 14.9988602430
X_25 = 15.3278724293
X_26 = 15.6405019034
X_27 = 15.8746370878
X_28 = 15.7326835354
X_29 = 13.7887805892
X_30 = 3.2112194108
X_31 = 1.2673164646
X_32 = 1.1253629122
X_33 = 1.3594980966
X_34 = 1.6721275707
X_35 = 2.0011397569

```

X\_36 = 2.3335712140  
 X\_37 = 2.6667163132  
 X\_38 = 3.0000103518  
 X\_39 = 3.3333354460  
 X\_40 = 3.6666668780  
 X\_41 = 3.9999989440  
 X\_42 = 4.3333278420  
 X\_43 = 4.6666402659  
 X\_44 = 4.9998734877  
 X\_45 = 5.3327271727  
 X\_46 = 5.6637623758  
 X\_47 = 5.9860847064  
 X\_48 = 6.2666611561  
 X\_49 = 6.3472210742  
 X\_50 = 5.4694442148

The Solutions of the System:

b =

Columns 1 through 33

	23	24	25	26	27	28	29	30	31	32	33	34	35	36
37	38	39	40	41	42	43	44	45	46	47	48	49	50	
1	2	3	4	5										

Columns 34 through 50

	6	7	8	9	10	11	12	13	14	15	16	17	18	19
--	---	---	---	---	----	----	----	----	----	----	----	----	----	----

20 21 22  
 X\_ 1 = 6.1361108815  
 X\_ 2 = 7.6805544075  
 X\_ 3 = 8.2666611561  
 X\_ 4 = 8.6527513730  
 X\_ 5 = 8.9970957091  
 X\_ 6 = 9.3327271725  
 X\_ 7 = 9.6665401535  
 X\_ 8 = 9.9999735952  
 X\_ 9 = 10.3333278223  
 X\_10 = 10.6666655165  
 X\_11 = 10.9999997599  
 X\_12 = 11.3333332832  
 X\_13 = 11.6666666560  
 X\_14 = 11.9999999970  
 X\_15 = 12.3333333288  
 X\_16 = 12.6666666469  
 X\_17 = 12.9999999058  
 X\_18 = 13.3333328819  
 X\_19 = 13.6666645039  
 X\_20 = 13.9999896377  
 X\_21 = 14.3332836846  
 X\_22 = 14.6664287855  
 X\_23 = 14.9988602430  
 X\_24 = 15.3278724293  
 X\_25 = 15.6405019034  
 X\_26 = 15.8746370878  
 X\_27 = 15.7326835354  
 X\_28 = 13.7887805892  
 X\_29 = 3.2112194108

X\_30 = 1.2673164646  
 X\_31 = 1.1253629122  
 X\_32 = 1.3594980966  
 X\_33 = 1.6721275707  
 X\_34 = 2.0011397570  
 X\_35 = 2.3335712144  
 X\_36 = 2.6667163149  
 X\_37 = 3.0000103600  
 X\_38 = 3.3333354851  
 X\_39 = 3.666670657  
 X\_40 = 3.999998432  
 X\_41 = 4.3333321505  
 X\_42 = 4.6666609093  
 X\_43 = 4.9999723958  
 X\_44 = 5.3332010698  
 X\_45 = 5.6660329531  
 X\_46 = 5.9969636959  
 X\_47 = 6.3187855264  
 X\_48 = 6.5969639359  
 X\_49 = 6.6660341533  
 X\_50 = 5.7332068307

The Solutions of the System:

b =

Columns 1 through 33

	24	25	26	27	28	29	30	31	32	33	34	35	36	37
38	39	40	41	42	43	44	45	46	47	48	49	50	1	
2	3	4	5	6										

Columns 34 through 50

	7	8	9	10	11	12	13	14	15	16	17	18	19	20
--	---	---	---	----	----	----	----	----	----	----	----	----	----	----

21 22 23  
 X\_ 1 = 6.3998734973  
 X\_ 2 = 7.9993674867  
 X\_ 3 = 8.5969639359  
 X\_ 4 = 8.9854521930  
 X\_ 5 = 9.3302970292  
 X\_ 6 = 9.6660329531  
 X\_ 7 = 9.9998677363  
 X\_ 8 = 10.3333057283  
 X\_ 9 = 10.6666609052  
 X\_10 = 10.9999987975  
 X\_11 = 11.3333330823  
 X\_12 = 11.6666666141  
 X\_13 = 11.9999999882  
 X\_14 = 12.3333333269  
 X\_15 = 12.6666666465  
 X\_16 = 12.9999999057  
 X\_17 = 13.3333328819  
 X\_18 = 13.6666645039  
 X\_19 = 13.9999896377  
 X\_20 = 14.3332836846  
 X\_21 = 14.6664287855  
 X\_22 = 14.9988602430  
 X\_23 = 15.3278724293

```

X_24 = 15.6405019034
X_25 = 15.8746370878
X_26 = 15.7326835354
X_27 = 13.7887805892
X_28 = 3.2112194108
X_29 = 1.2673164646
X_30 = 1.1253629122
X_31 = 1.3594980966
X_32 = 1.6721275707
X_33 = 2.0011397570
X_34 = 2.3335712145
X_35 = 2.6667163152
X_36 = 3.0000103618
X_37 = 3.3333354937
X_38 = 3.6666671066
X_39 = 4.0000000396
X_40 = 4.3333330911
X_41 = 4.6666654160
X_42 = 4.9999939888
X_43 = 5.3333045282
X_44 = 5.6665286524
X_45 = 5.9993387337
X_46 = 6.3301650160
X_47 = 6.6514863464
X_48 = 6.9272667158
X_49 = 6.9848472325
X_50 = 5.9969694465

```

The Solutions of the System:

b =

```

Columns 1 through 33
    25    26    27    28    29    30    31    32    33    34    35    36    37    38
39    40    41    42    43    44    45    46    47    48    49    50     1     2
3     4     5     6     7
Columns 34 through 50
    8     9    10    11    12    13    14    15    16    17    18    19    20    21
22    23    24
X_ 1 = 6.6636361132
X_ 2 = 8.3181805658
X_ 3 = 8.9272667158
X_ 4 = 9.3181530130
X_ 5 = 9.6634983493
X_ 6 = 9.9993387337
X_ 7 = 10.3331953190
X_ 8 = 10.6666378614
X_ 9 = 10.9999939880
X_10 = 11.3333320785
X_11 = 11.6666664046
X_12 = 11.9999999445
X_13 = 12.3333333178
X_14 = 12.6666666446
X_15 = 12.9999999053
X_16 = 13.3333328818
X_17 = 13.6666645039

```

```

X_18 = 13.9999896377
X_19 = 14.3332836846
X_20 = 14.6664287855
X_21 = 14.9988602430
X_22 = 15.3278724293
X_23 = 15.6405019034
X_24 = 15.8746370878
X_25 = 15.7326835354
X_26 = 13.7887805892
X_27 = 3.2112194108
X_28 = 1.2673164646
X_29 = 1.1253629122
X_30 = 1.3594980966
X_31 = 1.6721275707
X_32 = 2.0011397570
X_33 = 2.3335712145
X_34 = 2.6667163153
X_35 = 3.0000103622
X_36 = 3.3333354956
X_37 = 3.6666671156
X_38 = 4.0000000823
X_39 = 4.3333332961
X_40 = 4.6666663980
X_41 = 4.9999986938
X_42 = 5.3333270710
X_43 = 5.6666366612
X_44 = 5.9998562351
X_45 = 6.3326445142
X_46 = 6.6633663361
X_47 = 6.9841871663
X_48 = 7.2575694956
X_49 = 7.3036603116
X_50 = 6.2607320623

```

The Solutions of the System:

b =

```

Columns 1 through 33
    26    27    28    29    30    31    32    33    34    35    36    37    38    39
40    41    42    43    44    45    46    47    48    49    50     1     2     3
4     5     6     7     8
Columns 34 through 50
    9    10    11    12    13    14    15    16    17    18    19    20    21    22
23    24    25
X_ 1 = 6.9273987290
X_ 2 = 8.6369936449
X_ 3 = 9.2575694956
X_ 4 = 9.6508538330
X_ 5 = 9.9966996694
X_ 6 = 10.3326445142
X_ 7 = 10.6665229017
X_ 8 = 10.9999699945
X_ 9 = 11.3333270708
X_10 = 11.6666653594
X_11 = 11.9999997263

```

```

X_12 = 12.3333332723
X_13 = 12.6666666351
X_14 = 12.9999999033
X_15 = 13.3333328814
X_16 = 13.6666645038
X_17 = 13.9999896377
X_18 = 14.3332836846
X_19 = 14.6664287855
X_20 = 14.9988602430
X_21 = 15.3278724293
X_22 = 15.6405019034
X_23 = 15.8746370878
X_24 = 15.7326835354
X_25 = 13.7887805892
X_26 = 3.2112194108
X_27 = 1.2673164646
X_28 = 1.1253629122
X_29 = 1.3594980966
X_30 = 1.6721275707
X_31 = 2.0011397570
X_32 = 2.3335712145
X_33 = 2.6667163153
X_34 = 3.0000103623
X_35 = 3.3333354960
X_36 = 3.6666671175
X_37 = 4.0000000916
X_38 = 4.3333333406
X_39 = 4.6666666116
X_40 = 4.999997171
X_41 = 5.3333319742
X_42 = 5.6666601537
X_43 = 5.9999687943
X_44 = 6.3331838178
X_45 = 6.6659502948
X_46 = 6.9965676562
X_47 = 7.3168879863
X_48 = 7.5878722754
X_49 = 7.6224733907
X_50 = 6.5244946781

```

The Solutions of the System:

b =

```

Columns 1 through 33
  27    28    29    30    31    32    33    34    35    36    37    38    39    40
41    42    43    44    45    46    47    48    49    50     1     2     3     4
5     6     7     8     9
Columns 34 through 50
  10    11    12    13    14    15    16    17    18    19    20    21    22    23
24    25    26
X_ 1 = 7.1911613448
X_ 2 = 8.9558067240
X_ 3 = 9.5878722754
X_ 4 = 9.9835546530
X_ 5 = 10.3299009896

```



X\_ 6 = 10.6659502948  
 X\_ 7 = 10.9998504845  
 X\_ 8 = 11.3333021276  
 X\_ 9 = 11.6666601535  
 X\_10 = 11.9999986398  
 X\_11 = 12.3333330455  
 X\_12 = 12.6666665878  
 X\_13 = 12.9999998934  
 X\_14 = 13.3333328794  
 X\_15 = 13.6666645034  
 X\_16 = 13.9999896376  
 X\_17 = 14.3332836846  
 X\_18 = 14.6664287855  
 X\_19 = 14.9988602430  
 X\_20 = 15.3278724293  
 X\_21 = 15.6405019034  
 X\_22 = 15.8746370878  
 X\_23 = 15.7326835354  
 X\_24 = 13.7887805892  
 X\_25 = 3.2112194108  
 X\_26 = 1.2673164646  
 X\_27 = 1.1253629122  
 X\_28 = 1.3594980966  
 X\_29 = 1.6721275707  
 X\_30 = 2.0011397570  
 X\_31 = 2.3335712145  
 X\_32 = 2.6667163154  
 X\_33 = 3.0000103623  
 X\_34 = 3.3333354960  
 X\_35 = 3.6666671179  
 X\_36 = 4.0000000937  
 X\_37 = 4.3333333503  
 X\_38 = 4.6666666579  
 X\_39 = 4.999999394  
 X\_40 = 5.3333330389  
 X\_41 = 5.6666652551  
 X\_42 = 5.9999932365  
 X\_43 = 6.3333009274  
 X\_44 = 6.6665114006  
 X\_45 = 6.9992560754  
 X\_46 = 7.3297689763  
 X\_47 = 7.6495888063  
 X\_48 = 7.9181750552  
 X\_49 = 7.9412864698  
 X\_50 = 6.7882572940

The Solutions of the System:

b =

Columns 1 through 33														
	28	29	30	31	32	33	34	35	36	37	38	39	40	41
42	43	44	45	46	47	48	49	50	1	2	3	4	5	
6	7	8	9	10										
Columns 34 through 50														
	11	12	13	14	15	16	17	18	19	20	21	22	23	24

25	26	27
X_1	=	7.4549239606
X_2	=	9.2746198032
X_3	=	9.9181750552
X_4	=	10.3162554730
X_5	=	10.6631023097
X_6	=	10.9992560754
X_7	=	11.3331780672
X_8	=	11.6666342606
X_9	=	11.9999932356
X_10	=	12.3333319176
X_11	=	12.6666663524
X_12	=	12.9999998443
X_13	=	13.3333328691
X_14	=	13.6666645013
X_15	=	13.9999896372
X_16	=	14.3332836845
X_17	=	14.6664287855
X_18	=	14.9988602430
X_19	=	15.3278724293
X_20	=	15.6405019034
X_21	=	15.8746370878
X_22	=	15.7326835354
X_23	=	13.7887805892
X_24	=	3.2112194108
X_25	=	1.2673164646
X_26	=	1.1253629122
X_27	=	1.3594980966
X_28	=	1.6721275707
X_29	=	2.0011397570
X_30	=	2.3335712145
X_31	=	2.6667163154
X_32	=	3.0000103623
X_33	=	3.3333354961
X_34	=	3.6666671180
X_35	=	4.0000000941
X_36	=	4.3333333524
X_37	=	4.6666666680
X_38	=	4.9999999875
X_39	=	5.3333332697
X_40	=	5.6666663612
X_41	=	5.9999985361
X_42	=	6.3333263193
X_43	=	6.6666330605
X_44	=	6.9998389833
X_45	=	7.3325618559
X_46	=	7.6629702964
X_47	=	7.9822896263
X_48	=	8.2484778351
X_49	=	8.2600995490
X_50	=	7.0520199098

The Solutions of the System:

```

b =
  Columns 1 through 33
    29    30    31    32    33    34    35    36    37    38    39    40    41    42
43    44    45    46    47    48    49    50     1     2     3     4     5     6
7     8     9    10    11
  Columns 34 through 50
    12    13    14    15    16    17    18    19    20    21    22    23    24    25
26    27    28
X_ 1 = 7.7186865765
X_ 2 = 9.5934328823
X_ 3 = 10.2484778351
X_ 4 = 10.6489562930
X_ 5 = 10.9963036298
X_ 6 = 11.3325618559
X_ 7 = 11.6665056498
X_ 8 = 11.9999663930
X_ 9 = 12.3333263152
X_10 = 12.6666651831
X_11 = 12.9999996003
X_12 = 13.3333328182
X_13 = 13.6666644906
X_14 = 13.9999896349
X_15 = 14.3332836841
X_16 = 14.6664287854
X_17 = 14.9988602429
X_18 = 15.3278724293
X_19 = 15.6405019034
X_20 = 15.8746370878
X_21 = 15.7326835354
X_22 = 13.7887805892
X_23 = 3.2112194108
X_24 = 1.2673164646
X_25 = 1.1253629122
X_26 = 1.3594980966
X_27 = 1.6721275707
X_28 = 2.0011397570
X_29 = 2.3335712145
X_30 = 2.6667163154
X_31 = 3.0000103623
X_32 = 3.3333354961
X_33 = 3.6666671181
X_34 = 4.0000000942
X_35 = 4.3333333529
X_36 = 4.6666666702
X_37 = 4.9999999980
X_38 = 5.3333333197
X_39 = 5.6666666007
X_40 = 5.9999996836
X_41 = 6.3333318171
X_42 = 6.666594022
X_43 = 6.9999651936
X_44 = 7.3331665660
X_45 = 7.6658676365
X_46 = 7.9961716166

```

$X_{47} = 8.3149904463$   
 $X_{48} = 8.5787806149$   
 $X_{49} = 8.5789126281$   
 $X_{50} = 7.3157825256$

The Solutions of the System:

b =

Columns 1 through 33

30	31	32	33	34	35	36	37	38	39	40	41	42	43
44	45	46	47	48	49	50	1	2	3	4	5	6	7
8	9	10	11	12									

Columns 34 through 50

13	14	15	16	17	18	19	20	21	22	23	24	25	26
27	28	29											

$X_1 = 7.9824491923$   
 $X_2 = 9.9122459614$   
 $X_3 = 10.5787806149$   
 $X_4 = 10.9816571129$   
 $X_5 = 11.3295049499$   
 $X_6 = 11.6658676363$   
 $X_7 = 11.9998332318$   
 $X_8 = 12.3332985229$   
 $X_9 = 12.6666593825$   
 $X_{10} = 12.9999983896$   
 $X_{11} = 13.3333325655$   
 $X_{12} = 13.6666644379$   
 $X_{13} = 13.9999896239$   
 $X_{14} = 14.3332836818$   
 $X_{15} = 14.6664287849$   
 $X_{16} = 14.9988602428$   
 $X_{17} = 15.3278724292$   
 $X_{18} = 15.6405019034$   
 $X_{19} = 15.8746370878$   
 $X_{20} = 15.7326835354$   
 $X_{21} = 13.7887805892$   
 $X_{22} = 3.2112194108$   
 $X_{23} = 1.2673164646$   
 $X_{24} = 1.1253629122$   
 $X_{25} = 1.3594980966$   
 $X_{26} = 1.6721275707$   
 $X_{27} = 2.0011397570$   
 $X_{28} = 2.3335712145$   
 $X_{29} = 2.6667163154$   
 $X_{30} = 3.0000103623$   
 $X_{31} = 3.3333354961$   
 $X_{32} = 3.6666671181$   
 $X_{33} = 4.0000000942$   
 $X_{34} = 4.3333333530$   
 $X_{35} = 4.6666666706$   
 $X_{36} = 5.0000000002$   
 $X_{37} = 5.3333333305$   
 $X_{38} = 5.6666666524$   
 $X_{39} = 5.9999999317$   
 $X_{40} = 6.3333330060$

```

X_41 = 6.6666650982
X_42 = 6.9999924850
X_43 = 7.3332973268
X_44 = 7.6664941488
X_45 = 7.9991734171
X_46 = 8.3293729367
X_47 = 8.6476912663
X_48 = 8.9090833947
X_49 = 8.8977257072
X_50 = 7.5795451414

```

The Solutions of the System:

b =

```

Columns 1 through 33
    31    32    33    34    35    36    37    38    39    40    41    42    43    44
45    46    47    48    49    50     1     2     3     4     5     6     7     8
9     10    11    12    13

```

```

Columns 34 through 50
    14    15    16    17    18    19    20    21    22    23    24    25    26    27
28    29    30

```

```

X_ 1 = 8.2462118081
X_ 2 = 10.2310590406
X_ 3 = 10.9090833947
X_ 4 = 11.3143579329
X_ 5 = 11.6627062698
X_ 6 = 11.9991734162
X_ 7 = 12.3331608113
X_ 8 = 12.6666306404
X_ 9 = 12.9999923908
X_10 = 13.3333313135
X_11 = 13.6666641766
X_12 = 13.9999895694
X_13 = 14.3332836704
X_14 = 14.6664287825
X_15 = 14.9988602423
X_16 = 15.3278724291
X_17 = 15.6405019034
X_18 = 15.8746370878
X_19 = 15.7326835354
X_20 = 13.7887805892
X_21 = 3.2112194108
X_22 = 1.2673164646
X_23 = 1.1253629122
X_24 = 1.3594980966
X_25 = 1.6721275707
X_26 = 2.0011397570
X_27 = 2.3335712145
X_28 = 2.6667163154
X_29 = 3.0000103623
X_30 = 3.3333354961
X_31 = 3.6666671181
X_32 = 4.0000000942
X_33 = 4.3333333530
X_34 = 4.6666666707

```

```

X_35 = 5.0000000007
X_36 = 5.3333333329
X_37 = 5.6666666636
X_38 = 5.9999999853
X_39 = 6.3333332627
X_40 = 6.6666663284
X_41 = 6.9999983792
X_42 = 7.3333255678
X_43 = 7.6666294599
X_44 = 7.9998217315
X_45 = 8.3324791977
X_46 = 8.6625742568
X_47 = 8.9803920863
X_48 = 9.2393861745
X_49 = 9.2165387864
X_50 = 7.8433077573

```

The Solutions of the System:

b =

```

Columns 1 through 33
    32    33    34    35    36    37    38    39    40    41    42    43    44    45
46    47    48    49    50    1     2     3     4     5     6     7     8     9
10    11    12    13    14

```

```

Columns 34 through 50
    15    16    17    18    19    20    21    22    23    24    25    26    27    28
29    30    31

```

```

X_ 1 = 8.5099744239
X_ 2 = 10.5498721197
X_ 3 = 11.2393861745
X_ 4 = 11.6470587527
X_ 5 = 11.9959075893
X_ 6 = 12.3324791936
X_ 7 = 12.6664883785
X_ 8 = 12.9999626990
X_ 9 = 13.3333251164
X_10 = 13.6666628832
X_11 = 13.9999892994
X_12 = 14.3332836140
X_13 = 14.6664287708
X_14 = 14.9988602399
X_15 = 15.3278724286
X_16 = 15.6405019033
X_17 = 15.8746370877
X_18 = 15.7326835354
X_19 = 13.7887805892
X_20 = 3.2112194108
X_21 = 1.2673164646
X_22 = 1.1253629122
X_23 = 1.3594980966
X_24 = 1.6721275707
X_25 = 2.0011397570
X_26 = 2.3335712145
X_27 = 2.6667163154
X_28 = 3.0000103623

```

```

X_29 = 3.3333354961
X_30 = 3.6666671181
X_31 = 4.0000000942
X_32 = 4.3333333530
X_33 = 4.6666666708
X_34 = 5.0000000008
X_35 = 5.3333333334
X_36 = 5.6666666660
X_37 = 5.9999999968
X_38 = 6.3333333181
X_39 = 6.6666665938
X_40 = 6.9999996508
X_41 = 7.3333316603
X_42 = 7.6666586507
X_43 = 7.9999615930
X_44 = 8.3331493142
X_45 = 8.6657849782
X_46 = 8.9957755769
X_47 = 9.3130929062
X_48 = 9.5696889543
X_49 = 9.5353518655
X_50 = 8.1070703731

```

The Solutions of the System:

b =

```

Columns 1 through 33
    33    34    35    36    37    38    39    40    41    42    43    44    45    46
47    48    49    50     1     2     3     4     5     6     7     8     9    10
11    12    13    14    15
Columns 34 through 50
    16    17    18    19    20    21    22    23    24    25    26    27    28    29
30    31    32

```

```

X_ 1 = 8.7737370398
X_ 2 = 10.8686851988
X_ 3 = 11.5696889542
X_ 4 = 11.9797595721
X_ 5 = 12.3291089061
X_ 6 = 12.6657849586
X_ 7 = 12.9998158867
X_ 8 = 13.3332944749
X_ 9 = 13.6666564879
X_10 = 13.9999879647
X_11 = 14.3332833355
X_12 = 14.6664287126
X_13 = 14.9988602277
X_14 = 15.3278724261
X_15 = 15.6405019027
X_16 = 15.8746370876
X_17 = 15.7326835354
X_18 = 13.7887805892
X_19 = 3.2112194108
X_20 = 1.2673164646
X_21 = 1.1253629122
X_22 = 1.3594980966

```

```

X_23 = 1.6721275707
X_24 = 2.0011397570
X_25 = 2.3335712145
X_26 = 2.6667163154
X_27 = 3.0000103623
X_28 = 3.3333354961
X_29 = 3.6666671181
X_30 = 4.0000000942
X_31 = 4.3333333530
X_32 = 4.6666666708
X_33 = 5.0000000009
X_34 = 5.3333333335
X_35 = 5.6666666666
X_36 = 5.9999999993
X_37 = 6.3333333301
X_38 = 6.6666666510
X_39 = 6.9999999248
X_40 = 7.3333329732
X_41 = 7.6666649413
X_42 = 7.9999917335
X_43 = 8.3332937261
X_44 = 8.6664768970
X_45 = 8.9990907588
X_46 = 9.3289768970
X_47 = 9.6457937262
X_48 = 9.8999917342
X_49 = 9.8541649446
X_50 = 8.3708329889

```

The Solutions of the System:

b =

```

Columns 1 through 33
  34    35    36    37    38    39    40    41    42    43    44    45    46    47
48    49    50     1     2     3     4     5     6     7     8     9    10    11
12    13    14    15    16
Columns 34 through 50
  17    18    19    20    21    22    23    24    25    26    27    28    29    30
31    32    33

```

```

X_ 1 = 9.0374996556
X_ 2 = 11.1874982778
X_ 3 = 11.8999917333
X_ 4 = 12.3124603888
X_ 5 = 12.6623102107
X_ 6 = 12.9990906646
X_ 7 = 13.3331431123
X_ 8 = 13.6666248967
X_ 9 = 13.9999813712
X_10 = 14.3332819593
X_11 = 14.6664284254
X_12 = 14.9988601678
X_13 = 15.3278724136
X_14 = 15.6405019001
X_15 = 15.8746370871
X_16 = 15.7326835353

```



```

X_17 = 13.7887805892
X_18 = 3.2112194108
X_19 = 1.2673164646
X_20 = 1.1253629122
X_21 = 1.3594980966
X_22 = 1.6721275707
X_23 = 2.0011397570
X_24 = 2.3335712145
X_25 = 2.6667163154
X_26 = 3.0000103623
X_27 = 3.3333354961
X_28 = 3.666671181
X_29 = 4.0000000942
X_30 = 4.3333333530
X_31 = 4.666666708
X_32 = 5.0000000009
X_33 = 5.3333333335
X_34 = 5.6666666667
X_35 = 5.9999999999
X_36 = 6.3333333326
X_37 = 6.6666666633
X_38 = 6.9999999838
X_39 = 7.3333332559
X_40 = 7.6666662957
X_41 = 7.9999982224
X_42 = 8.3333248163
X_43 = 8.6666258592
X_44 = 8.9998044797
X_45 = 9.3323965394
X_46 = 9.6621782171
X_47 = 9.9784945462
X_48 = 10.2302945140
X_49 = 10.1729780237
X_50 = 8.6345956047

```

The Solutions of the System:

b =

```

Columns 1 through 33
  35    36    37    38    39    40    41    42    43    44    45    46    47    48
49    50     1     2     3     4     5     6     7     8     9    10    11    12
13    14    15    16    17
Columns 34 through 50
  18    19    20    21    22    23    24    25    26    27    28    29    30    31
32    33    34
X_ 1 = 9.3012622712
X_ 2 = 11.5063113562
X_ 3 = 12.2302945099
X_ 4 = 12.6451611932
X_ 5 = 12.9955114562
X_ 6 = 13.3323960880
X_ 7 = 13.6664689836
X_ 8 = 13.9999488303
X_ 9 = 14.3332751676
X_10 = 14.6664270079

```

```

X_11 = 14.9988598720
X_12 = 15.3278723518
X_13 = 15.6405018872
X_14 = 15.8746370844
X_15 = 15.7326835347
X_16 = 13.7887805891
X_17 = 3.2112194107
X_18 = 1.2673164646
X_19 = 1.1253629122
X_20 = 1.3594980966
X_21 = 1.6721275707
X_22 = 2.0011397570
X_23 = 2.3335712145
X_24 = 2.6667163154
X_25 = 3.0000103623
X_26 = 3.3333354961
X_27 = 3.6666671181
X_28 = 4.0000000942
X_29 = 4.3333333530
X_30 = 4.6666666708
X_31 = 5.0000000009
X_32 = 5.3333333335
X_33 = 5.6666666667
X_34 = 6.0000000000
X_35 = 6.3333333332
X_36 = 6.6666666659
X_37 = 6.9999999965
X_38 = 7.3333333167
X_39 = 7.6666665870
X_40 = 7.9999996181
X_41 = 8.3333315034
X_42 = 8.6666578992
X_43 = 8.9999579923
X_44 = 9.3331320625
X_45 = 9.6657023199
X_46 = 9.9953795372
X_47 = 10.3111953662
X_48 = 10.5605972938
X_49 = 10.4917911029
X_50 = 8.8983582206

```

The Solutions of the System:

b =

```

Columns 1 through 33
   36   37   38   39   40   41   42   43   44   45   46   47   48   49
50     1     2     3     4     5     6     7     8     9    10    11    12    13
14    15    16    17    18
Columns 34 through 50
   19   20   21   22   23   24   25   26   27   28   29   30   31   32
33    34    35
X_ 1 = 9.5650248864
X_ 2 = 11.8251244321
X_ 3 = 12.5605972742
X_ 4 = 12.9778619387

```

X\_ 5 = 13.3287124192  
 X\_ 6 = 13.6657001572  
 X\_ 7 = 13.9997883668  
 X\_ 8 = 14.3332416770  
 X\_ 9 = 14.6664200180  
 X\_10 = 14.9988584131  
 X\_11 = 15.3278720474  
 X\_12 = 15.6405018237  
 X\_13 = 15.8746370711  
 X\_14 = 15.7326835319  
 X\_15 = 13.7887805885  
 X\_16 = 3.2112194106  
 X\_17 = 1.2673164646  
 X\_18 = 1.1253629122  
 X\_19 = 1.3594980966  
 X\_20 = 1.6721275707  
 X\_21 = 2.0011397570  
 X\_22 = 2.3335712145  
 X\_23 = 2.6667163154  
 X\_24 = 3.0000103623  
 X\_25 = 3.3333354961  
 X\_26 = 3.6666671181  
 X\_27 = 4.0000000942  
 X\_28 = 4.3333333530  
 X\_29 = 4.6666666708  
 X\_30 = 5.0000000009  
 X\_31 = 5.3333333335  
 X\_32 = 5.6666666667  
 X\_33 = 6.0000000000  
 X\_34 = 6.3333333333  
 X\_35 = 6.6666666665  
 X\_36 = 6.9999999993  
 X\_37 = 7.3333333298  
 X\_38 = 7.6666666496  
 X\_39 = 7.9999999180  
 X\_40 = 8.3333329405  
 X\_41 = 8.6666647845  
 X\_42 = 8.9999909820  
 X\_43 = 9.3332901254  
 X\_44 = 9.6664596452  
 X\_45 = 9.9990081005  
 X\_46 = 10.3285808573  
 X\_47 = 10.6438961862  
 X\_48 = 10.8909000736  
 X\_49 = 10.8106041820  
 X\_50 = 9.1621208364

The Solutions of the System:

b =

Columns 1 through 33															
	37	38	39	40	41	42	43	44	45	46	47	48	49	50	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
16	17	18	19												
Columns 34 through 50															

	20	21	22	23	24	25	26	27	28	29	30	31	32	33
34	35	36												
X_1 = 9.8287874991														
X_2 = 12.1439374957														
X_3 = 12.8908999794														
X_4 = 13.3105624015														
X_5 = 13.6619120279														
X_6 = 13.9989977382														
X_7 = 14.3330766632														
X_8 = 14.6663855776														
X_9 = 14.9988512249														
X_10 = 15.3278705471														
X_11 = 15.6405015106														
X_12 = 15.8746370058														
X_13 = 15.7326835183														
X_14 = 13.7887805857														
X_15 = 3.2112194100														
X_16 = 1.2673164644														
X_17 = 1.1253629122														
X_18 = 1.3594980966														
X_19 = 1.6721275707														
X_20 = 2.0011397570														
X_21 = 2.3335712145														
X_22 = 2.6667163154														
X_23 = 3.0000103623														
X_24 = 3.3333354961														
X_25 = 3.6666671181														
X_26 = 4.0000000942														
X_27 = 4.3333333530														
X_28 = 4.6666666708														
X_29 = 5.0000000009														
X_30 = 5.3333333335														
X_31 = 5.6666666667														
X_32 = 6.0000000000														
X_33 = 6.3333333333														
X_34 = 6.6666666666														
X_35 = 6.9999999998														
X_36 = 7.3333333326														
X_37 = 7.6666666630														
X_38 = 7.9999999824														
X_39 = 8.3333332491														
X_40 = 8.6666662629														
X_41 = 8.9999980655														
X_42 = 9.3333240648														
X_43 = 9.6666222585														
X_44 = 9.9997872279														
X_45 = 10.3323138811														
X_46 = 10.6617821775														
X_47 = 10.9765970062														
X_48 = 11.2212028535														
X_49 = 11.1294172611														
X_50 = 9.4258834522														

The Solutions of the System:

```

b =
  Columns 1 through 33
    38    39    40    41    42    43    44    45    46    47    48    49    50     1
2     3     4     5     6     7     8     9    10    11    12    13    14    15    16
17    18    19    20
  Columns 34 through 50
    21    22    23    24    25    26    27    28    29    30    31    32    33    34
35    36    37
X_ 1 = 10.0925501001
X_ 2 = 12.4627505004
X_ 3 = 13.2212024021
X_ 4 = 13.6432615101
X_ 5 = 13.9951051485
X_ 6 = 14.3322642324
X_ 7 = 14.6662160134
X_ 8 = 14.9988158348
X_ 9 = 15.3278631608
X_10 = 15.6404999690
X_11 = 15.8746366840
X_12 = 15.7326834511
X_13 = 13.7887805716
X_14 = 3.2112194071
X_15 = 1.2673164638
X_16 = 1.1253629121
X_17 = 1.3594980966
X_18 = 1.6721275707
X_19 = 2.0011397570
X_20 = 2.3335712145
X_21 = 2.6667163154
X_22 = 3.0000103623
X_23 = 3.3333354961
X_24 = 3.6666671181
X_25 = 4.0000000942
X_26 = 4.3333333530
X_27 = 4.6666666708
X_28 = 5.0000000009
X_29 = 5.3333333335
X_30 = 5.6666666667
X_31 = 6.0000000000
X_32 = 6.3333333333
X_33 = 6.6666666667
X_34 = 7.0000000000
X_35 = 7.3333333332
X_36 = 7.6666666659
X_37 = 7.9999999962
X_38 = 8.3333333153
X_39 = 8.6666665801
X_40 = 8.9999995853
X_41 = 9.3333313466
X_42 = 9.6666571477
X_43 = 9.9999543917
X_44 = 10.3331148107
X_45 = 10.6656196616
X_46 = 10.9949834976

```

$X_{47} = 11.3092978262$   
 $X_{48} = 11.5515056333$   
 $X_{49} = 11.4482303403$   
 $X_{50} = 9.6896460681$

The Solutions of the System:

b =

Columns 1 through 33														
	39	40	41	42	43	44	45	46	47	48	49	50	1	2
3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
18	19	20	21											

Columns 34 through 50														
	22	23	24	25	26	27	28	29	30	31	32	33	34	35
36	37	38												

$X_1 = 10.3563126446$   
 $X_2 = 12.7815632231$   
 $X_3 = 13.5515034707$   
 $X_4 = 13.9759541306$   
 $X_5 = 14.3282671822$   
 $X_6 = 14.6653817805$   
 $X_7 = 14.9986417203$   
 $X_8 = 15.3278268209$   
 $X_9 = 15.6404923844$   
 $X_{10} = 15.8746351010$   
 $X_{11} = 15.7326831207$   
 $X_{12} = 13.7887805027$   
 $X_{13} = 3.2112193927$   
 $X_{14} = 1.2673164608$   
 $X_{15} = 1.1253629115$   
 $X_{16} = 1.3594980964$   
 $X_{17} = 1.6721275707$   
 $X_{18} = 2.0011397570$   
 $X_{19} = 2.3335712145$   
 $X_{20} = 2.6667163154$   
 $X_{21} = 3.0000103623$   
 $X_{22} = 3.3333354961$   
 $X_{23} = 3.6666671181$   
 $X_{24} = 4.0000000942$   
 $X_{25} = 4.3333333530$   
 $X_{26} = 4.6666666708$   
 $X_{27} = 5.0000000009$   
 $X_{28} = 5.3333333335$   
 $X_{29} = 5.6666666667$   
 $X_{30} = 6.0000000000$   
 $X_{31} = 6.3333333333$   
 $X_{32} = 6.6666666667$   
 $X_{33} = 7.0000000000$   
 $X_{34} = 7.3333333333$   
 $X_{35} = 7.6666666665$   
 $X_{36} = 7.9999999992$   
 $X_{37} = 8.3333333295$   
 $X_{38} = 8.6666666481$   
 $X_{39} = 8.9999999112$   
 $X_{40} = 9.3333329078$

```

X_41 = 9.6666646277
X_42 = 9.9999902305
X_43 = 10.3332865248
X_44 = 10.6664423934
X_45 = 10.9989254422
X_46 = 11.3281848177
X_47 = 11.6419986462
X_48 = 11.8818084131
X_49 = 11.7670434194
X_50 = 9.9534086839

```

The Solutions of the System:

b =

```

Columns 1 through 33
    40    41    42    43    44    45    46    47    48    49    50    1    2    3
4      5      6      7      8      9     10     11     12     13     14     15     16     17     18
19     20     21     22
Columns 34 through 50
    23    24    25    26    27    28    29    30    31    32    33    34    35    36
37     38     39

```

```

X_ 1 = 10.6200749188
X_ 2 = 13.1003745941
X_ 3 = 13.8817980517
X_ 4 = 14.3086156643
X_ 5 = 14.6612802699
X_ 6 = 14.9977856852
X_ 7 = 15.3276481560
X_ 8 = 15.6404550949
X_ 9 = 15.8746273182
X_10 = 15.7326814964
X_11 = 13.7887801637
X_12 = 3.2112193219
X_13 = 1.2673164461
X_14 = 1.1253629084
X_15 = 1.3594980958
X_16 = 1.6721275706
X_17 = 2.0011397570
X_18 = 2.3335712145
X_19 = 2.6667163154
X_20 = 3.0000103623
X_21 = 3.3333354961
X_22 = 3.6666671181
X_23 = 4.0000000942
X_24 = 4.3333333530
X_25 = 4.6666666708
X_26 = 5.0000000009
X_27 = 5.3333333335
X_28 = 5.6666666667
X_29 = 6.0000000000
X_30 = 6.3333333333
X_31 = 6.6666666667
X_32 = 7.0000000000
X_33 = 7.3333333333
X_34 = 7.6666666666

```

```

X_35 = 7.9999999998
X_36 = 8.3333333325
X_37 = 8.6666666627
X_38 = 8.9999999810
X_39 = 9.3333332422
X_40 = 9.6666662302
X_41 = 9.999979087
X_42 = 10.3333233133
X_43 = 10.6666186579
X_44 = 10.9997699761
X_45 = 11.3322312228
X_46 = 11.6613861378
X_47 = 11.9746994661
X_48 = 12.2121111929
X_49 = 12.0858564985
X_50 = 10.2171712997

```

The Solutions of the System:

b =

```

Columns 1 through 33
    41    42    43    44    45    46    47    48    49    50    1    2    3    4
5      6      7      8      9    10    11    12    13    14    15    16    17    18    19
20     21     22     23
Columns 34 through 50
    24    25    26    27    28    29    30    31    32    33    34    35    36    37
38     39     40

```

```

X_ 1 = 10.8838358978
X_ 2 = 13.4191794892
X_ 3 = 14.2120615484
X_ 4 = 14.6411282525
X_ 5 = 14.9935797143
X_ 6 = 15.3267703188
X_ 7 = 15.6402718795
X_ 8 = 15.8745890790
X_ 9 = 15.7326735154
X_10 = 13.7887784979
X_11 = 3.2112189743
X_12 = 1.2673163735
X_13 = 1.1253628932
X_14 = 1.3594980926
X_15 = 1.6721275699
X_16 = 2.0011397569
X_17 = 2.3335712144
X_18 = 2.6667163153
X_19 = 3.0000103623
X_20 = 3.3333354961
X_21 = 3.6666671181
X_22 = 4.0000000942
X_23 = 4.3333333530
X_24 = 4.6666666708
X_25 = 5.0000000009
X_26 = 5.3333333335
X_27 = 5.6666666667
X_28 = 6.0000000000

```



```

X_29 = 6.3333333333
X_30 = 6.6666666667
X_31 = 7.0000000000
X_32 = 7.3333333333
X_33 = 7.6666666667
X_34 = 8.0000000000
X_35 = 8.3333333332
X_36 = 8.6666666658
X_37 = 8.9999999959
X_38 = 9.3333333138
X_39 = 9.6666665733
X_40 = 9.9999995526
X_41 = 10.3333311898
X_42 = 10.6666563962
X_43 = 10.9999507910
X_44 = 11.3330975589
X_45 = 11.6655370034
X_46 = 11.9945874579
X_47 = 12.3074002861
X_48 = 12.5424139728
X_49 = 12.4046695777
X_50 = 10.4809339155

```

The Solutions of the System:

b =

```

Columns 1 through 33
  42    43    44    45    46    47    48    49    50     1     2     3     4     5
6     7     8     9    10    11    12    13    14    15    16    17    18    19    20
21    22    23    24
Columns 34 through 50
  25    26    27    28    29    30    31    32    33    34    35    36    37    38
39    40    41
X_ 1 = 11.1475906713
X_ 2 = 13.7379533565
X_ 3 = 14.5421761113
X_ 4 = 14.9729271999
X_ 5 = 15.3224598880
X_ 6 = 15.6393722403
X_ 7 = 15.8744013133
X_ 8 = 15.7326343264
X_ 9 = 13.7887703187
X_10 = 3.2112172672
X_11 = 1.2673160172
X_12 = 1.1253628189
X_13 = 1.3594980771
X_14 = 1.6721275667
X_15 = 2.0011397562
X_16 = 2.3335712143
X_17 = 2.6667163153
X_18 = 3.0000103623
X_19 = 3.3333354961
X_20 = 3.6666671181
X_21 = 4.0000000942
X_22 = 4.3333333530

```

```

X_23 = 4.6666666708
X_24 = 5.0000000009
X_25 = 5.3333333335
X_26 = 5.6666666667
X_27 = 6.0000000000
X_28 = 6.3333333333
X_29 = 6.6666666667
X_30 = 7.0000000000
X_31 = 7.3333333333
X_32 = 7.6666666667
X_33 = 8.0000000000
X_34 = 8.3333333333
X_35 = 8.6666666665
X_36 = 8.9999999991
X_37 = 9.3333333292
X_38 = 9.6666666467
X_39 = 9.9999999043
X_40 = 10.3333328750
X_41 = 10.6666644708
X_42 = 10.9999894790
X_43 = 11.3332829241
X_44 = 11.6664251416
X_45 = 11.9988427839
X_46 = 12.3277887780
X_47 = 12.6401011061
X_48 = 12.8727167526
X_49 = 12.7234826568
X_50 = 10.7446965314

```

The Solutions of the System:

b =

```

Columns 1 through 33
  43    44    45    46    47    48    49    50    1    2    3    4    5    6
7      8      9     10     11     12     13     14     15     16     17     18     19     20     21
22     23     24     25
Columns 34 through 50
  26     27     28     29     30     31     32     33     34     35     36     37     38     39
40     41     42
X_ 1 = 11.4113157121
X_ 2 = 14.0565785604
X_ 3 = 14.8715770898
X_ 4 = 15.3013068884
X_ 5 = 15.6349573522
X_ 6 = 15.8734798725
X_ 7 = 15.7324420105
X_ 8 = 13.7887301801
X_ 9 = 3.2112088898
X_10 = 1.2673142687
X_11 = 1.1253624539
X_12 = 1.3594980009
X_13 = 1.6721275508
X_14 = 2.0011397529
X_15 = 2.3335712136
X_16 = 2.6667163152

```

```

X_17 = 3.0000103622
X_18 = 3.3333354961
X_19 = 3.6666671181
X_20 = 4.0000000942
X_21 = 4.3333333530
X_22 = 4.6666666708
X_23 = 5.0000000009
X_24 = 5.3333333335
X_25 = 5.6666666667
X_26 = 6.0000000000
X_27 = 6.3333333333
X_28 = 6.6666666667
X_29 = 7.0000000000
X_30 = 7.3333333333
X_31 = 7.6666666667
X_32 = 8.0000000000
X_33 = 8.3333333333
X_34 = 8.6666666666
X_35 = 8.9999999998
X_36 = 9.3333333324
X_37 = 9.6666666624
X_38 = 9.9999999796
X_39 = 10.3333332354
X_40 = 10.6666661975
X_41 = 10.9999977519
X_42 = 11.3333225618
X_43 = 11.6666150572
X_44 = 11.9997527243
X_45 = 12.3321485645
X_46 = 12.6609900981
X_47 = 12.9728019261
X_48 = 13.2030195324
X_49 = 13.0422957359
X_50 = 11.0084591472

```

The Solutions of the System:

b =

```

Columns 1 through 33
  44    45    46    47    48    49    50     1     2     3     4     5     6     7
8     9    10    11    12    13    14    15    16    17    18    19    20    21    22
23    24    25    26
Columns 34 through 50
  27    28    29    30    31    32    33    34    35    36    37    38    39    40
41    42    43
X_ 1 = 11.6748982950
X_ 2 = 14.3744914749
X_ 3 = 15.1975590797
X_ 4 = 15.6133039237
X_ 5 = 15.8689605389
X_ 6 = 15.7314987707
X_ 7 = 13.7885333144
X_ 8 = 3.2111678015
X_ 9 = 1.2673056931
X_10 = 1.1253606641

```

```

X_11 = 1.3594976274
X_12 = 1.6721274728
X_13 = 2.0011397366
X_14 = 2.3335712102
X_15 = 2.6667163145
X_16 = 3.0000103621
X_17 = 3.3333354960
X_18 = 3.6666671180
X_19 = 4.0000000942
X_20 = 4.3333333530
X_21 = 4.6666666708
X_22 = 5.0000000009
X_23 = 5.3333333335
X_24 = 5.6666666667
X_25 = 6.0000000000
X_26 = 6.3333333333
X_27 = 6.6666666667
X_28 = 7.0000000000
X_29 = 7.3333333333
X_30 = 7.6666666667
X_31 = 8.0000000000
X_32 = 8.3333333333
X_33 = 8.6666666667
X_34 = 9.0000000000
X_35 = 9.3333333331
X_36 = 9.6666666658
X_37 = 9.9999999956
X_38 = 10.3333333124
X_39 = 10.6666665665
X_40 = 10.9999995199
X_41 = 11.3333310329
X_42 = 11.6666556447
X_43 = 11.9999471903
X_44 = 12.3330803071
X_45 = 12.6654543451
X_46 = 12.9941914182
X_47 = 13.3055027461
X_48 = 13.5333223122
X_49 = 13.3611088150
X_50 = 11.2722217630

```

The Solutions of the System:

b =

```

Columns 1 through 33
  45    46    47    48    49    50     1     2     3     4     5     6     7     8
9    10    11    12    13    14    15    16    17    18    19    20    21    22    23
24    25    26    27
Columns 34 through 50
  28    29    30    31    32    33    34    35    36    37    38    39    40    41
42    43    44
X_ 1 = 11.9377983213
X_ 2 = 14.6889916066
X_ 3 = 15.5071597117
X_ 4 = 15.8468069519

```

X\_5 = 15.7268750478  
X\_6 = 13.7875682873  
X\_7 = 3.2109663886  
X\_8 = 1.2672636558  
X\_9 = 1.1253518904  
X\_10 = 1.3594957962  
X\_11 = 1.6721270906  
X\_12 = 2.0011396568  
X\_13 = 2.3335711936  
X\_14 = 2.6667163110  
X\_15 = 3.0000103614  
X\_16 = 3.3333354959  
X\_17 = 3.6666671180  
X\_18 = 4.0000000942  
X\_19 = 4.3333333530  
X\_20 = 4.6666666708  
X\_21 = 5.0000000009  
X\_22 = 5.3333333335  
X\_23 = 5.6666666667  
X\_24 = 6.0000000000  
X\_25 = 6.3333333333  
X\_26 = 6.6666666667  
X\_27 = 7.0000000000  
X\_28 = 7.3333333333  
X\_29 = 7.6666666667  
X\_30 = 8.0000000000  
X\_31 = 8.3333333333  
X\_32 = 8.6666666667  
X\_33 = 9.0000000000  
X\_34 = 9.3333333333  
X\_35 = 9.6666666665  
X\_36 = 9.9999999991  
X\_37 = 10.3333333289  
X\_38 = 10.6666666453  
X\_39 = 10.9999998975  
X\_40 = 11.3333328423  
X\_41 = 11.6666643140  
X\_42 = 11.9999887275  
X\_43 = 12.3332793235  
X\_44 = 12.6664078898  
X\_45 = 12.9987601256  
X\_46 = 13.3273927383  
X\_47 = 13.6382035661  
X\_48 = 13.8636250921  
X\_49 = 13.6799218942  
X\_50 = 11.5359843788

The Solutions of the System:

$$b =$$

Columns 1 through 33

[illegible]

Columns 34 through 50

	29	30	31	32	33	34	35	36	37	38	39	40	41	42
43	44	45												
X_1 = 12.1974280226														
X_2 = 14.9871401129														
X_3 = 15.7382725421														
X_4 = 15.7042225975														
X_5 = 13.7828404456														
X_6 = 3.2099796306														
X_7 = 1.2670577074														
X_8 = 1.1253089065														
X_9 = 1.3594868249														
X_10 = 1.6721252182														
X_11 = 2.0011392660														
X_12 = 2.3335711120														
X_13 = 2.6667162940														
X_14 = 3.0000103578														
X_15 = 3.3333354951														
X_16 = 3.6666671179														
X_17 = 4.0000000942														
X_18 = 4.3333333530														
X_19 = 4.6666666708														
X_20 = 5.0000000009														
X_21 = 5.3333333335														
X_22 = 5.6666666667														
X_23 = 6.0000000000														
X_24 = 6.3333333333														
X_25 = 6.6666666667														
X_26 = 7.0000000000														
X_27 = 7.3333333333														
X_28 = 7.6666666667														
X_29 = 8.0000000000														
X_30 = 8.3333333333														
X_31 = 8.6666666667														
X_32 = 9.0000000000														
X_33 = 9.3333333333														
X_34 = 9.6666666666														
X_35 = 9.9999999998														
X_36 = 10.3333333324														
X_37 = 10.6666666621														
X_38 = 10.9999999781														
X_39 = 11.3333333286														
X_40 = 11.6666661647														
X_41 = 11.9999975950														
X_42 = 12.3333218103														
X_43 = 12.6666114566														
X_44 = 12.9997354726														
X_45 = 13.3320659062														
X_46 = 13.6605940585														
X_47 = 13.9709043861														
X_48 = 14.1939278719														
X_49 = 13.9987349733														
X_50 = 11.7997469947														

The Solutions of the System:

```

b =
  Columns 1 through 33
    47    48    49    50     1     2     3     4     5     6     7     8     9    10
11    12    13    14    15    16    17    18    19    20    21    22    23    24
25    26    27    28    29
  Columns 34 through 50
    30    31    32    33    34    35    36    37    38    39    40    41    42    43
44    45    46
X_ 1 = 12.4413886551
X_ 2 = 15.2069432755
X_ 3 = 15.5933277226
X_ 4 = 13.7596953376
X_ 5 = 3.2051489653
X_ 6 = 1.2660494889
X_ 7 = 1.1250984790
X_ 8 = 1.3594429062
X_ 9 = 1.6721160518
X_10 = 2.0011373529
X_11 = 2.3335707127
X_12 = 2.6667162106
X_13 = 3.0000103404
X_14 = 3.3333354915
X_15 = 3.6666671171
X_16 = 4.0000000940
X_17 = 4.3333333530
X_18 = 4.6666666708
X_19 = 5.0000000009
X_20 = 5.3333333335
X_21 = 5.6666666667
X_22 = 6.0000000000
X_23 = 6.3333333333
X_24 = 6.6666666667
X_25 = 7.0000000000
X_26 = 7.3333333333
X_27 = 7.6666666667
X_28 = 8.0000000000
X_29 = 8.3333333333
X_30 = 8.6666666667
X_31 = 9.0000000000
X_32 = 9.3333333333
X_33 = 9.6666666667
X_34 = 10.0000000000
X_35 = 10.3333333331
X_36 = 10.6666666657
X_37 = 10.9999999953
X_38 = 11.3333333110
X_39 = 11.6666665596
X_40 = 11.9999994871
X_41 = 12.3333308761
X_42 = 12.6666548931
X_43 = 12.9999435897
X_44 = 13.3330630553
X_45 = 13.6653716868
X_46 = 13.9937953786

```

X\_47 = 14.3036052061  
 X\_48 = 14.5242306517  
 X\_49 = 14.3175480524  
 X\_50 = 12.0635096105

The Solutions of the System:

b =

Columns 1 through 33

	48	49	50	1	2	3	4	5	6	7	8	9	10	11
12	13	14	15	16	17	18	19	20	21	22	23	24	25	
26	27	28	29	30										

Columns 34 through 50

	31	32	33	34	35	36	37	38	39	40	41	42	43	44
45	46	47												

X\_1 = 12.6102742690  
 X\_2 = 15.0513713449  
 X\_3 = 13.6465824554  
 X\_4 = 3.1815409322  
 X\_5 = 1.2611222055  
 X\_6 = 1.1240700951  
 X\_7 = 1.3592282699  
 X\_8 = 1.6720712546  
 X\_9 = 2.0011280032  
 X\_10 = 2.3335687613  
 X\_11 = 2.6667158033  
 X\_12 = 3.0000102554  
 X\_13 = 3.3333354738  
 X\_14 = 3.6666671134  
 X\_15 = 4.0000000932  
 X\_16 = 4.3333333528  
 X\_17 = 4.6666666707  
 X\_18 = 5.0000000008  
 X\_19 = 5.3333333335  
 X\_20 = 5.6666666667  
 X\_21 = 6.0000000000  
 X\_22 = 6.3333333333  
 X\_23 = 6.6666666667  
 X\_24 = 7.0000000000  
 X\_25 = 7.3333333333  
 X\_26 = 7.6666666667  
 X\_27 = 8.0000000000  
 X\_28 = 8.3333333333  
 X\_29 = 8.6666666667  
 X\_30 = 9.0000000000  
 X\_31 = 9.3333333333  
 X\_32 = 9.6666666667  
 X\_33 = 10.0000000000  
 X\_34 = 10.3333333333  
 X\_35 = 10.6666666665  
 X\_36 = 10.9999999990  
 X\_37 = 11.3333333286  
 X\_38 = 11.6666666439  
 X\_39 = 11.9999998907  
 X\_40 = 12.3333328096



```

X_41 = 12.6666641571
X_42 = 12.9999879760
X_43 = 13.3332757228
X_44 = 13.6663906380
X_45 = 13.9986774673
X_46 = 14.3269966987
X_47 = 14.6363060260
X_48 = 14.8545334315
X_49 = 14.6363611316
X_50 = 12.3272722263

```

The Solutions of the System:

b =

```

Columns 1 through 33
    49    50     1     2     3     4     5     6     7     8     9    10    11    12
13    14    15    16    17    18    19    20    21    22    23    24    25    26
27    28    29    30    31

```

```

Columns 34 through 50
    32    33    34    35    36    37    38    39    40    41    42    43    44    45
46    47    48

```

```

X_ 1 = 12.4194538583
X_ 2 = 13.0972692915
X_ 3 = 3.0668925993
X_ 4 = 1.2371937051
X_ 5 = 1.1190759263
X_ 6 = 1.3581859262
X_ 7 = 1.6718537048
X_ 8 = 2.0010825979
X_ 9 = 2.3335592847
X_10 = 2.6667138255
X_11 = 3.0000098426
X_12 = 3.3333353876
X_13 = 3.6666670954
X_14 = 4.0000000895
X_15 = 4.3333333520
X_16 = 4.6666666706
X_17 = 5.0000000008
X_18 = 5.3333333335
X_19 = 5.6666666667
X_20 = 6.0000000000
X_21 = 6.3333333333
X_22 = 6.6666666667
X_23 = 7.0000000000
X_24 = 7.3333333333
X_25 = 7.6666666667
X_26 = 8.0000000000
X_27 = 8.3333333333
X_28 = 8.6666666667
X_29 = 9.0000000000
X_30 = 9.3333333333
X_31 = 9.6666666667
X_32 = 10.0000000000
X_33 = 10.3333333333
X_34 = 10.6666666666

```

```

X_35 = 10.9999999998
X_36 = 11.3333333323
X_37 = 11.6666666618
X_38 = 11.9999999767
X_39 = 12.3333332217
X_40 = 12.6666661320
X_41 = 12.9999974382
X_42 = 13.3333210588
X_43 = 13.6666078559
X_44 = 13.9997182208
X_45 = 14.3319832479
X_46 = 14.6601980188
X_47 = 14.9690068460
X_48 = 15.1848362113
X_49 = 14.9551742107
X_50 = 12.5910348421

```

The Solutions of the System:

b =

```

Columns 1 through 33
    50      1      2      3      4      5      6      7      8      9     10     11     12     13
14     15     16     17     18     19     20     21     22     23     24     25     26     27
28     29     30     31     32

```

```

Columns 34 through 50
    33     34     35     36     37     38     39     40     41     42     43     44     45     46
47     48     49

```

```

X_ 1 = 10.5051783436
X_ 2 = 2.5258917181
X_ 3 = 1.1242802467
X_ 4 = 1.0955095153
X_ 5 = 1.3532673299
X_ 6 = 1.6708271340
X_ 7 = 2.0008683401
X_ 8 = 2.3335145665
X_ 9 = 2.6667044922
X_10 = 3.0000078947
X_11 = 3.3333349810
X_12 = 3.6666670106
X_13 = 4.0000000718
X_14 = 4.3333333483
X_15 = 4.6666666698
X_16 = 5.0000000007
X_17 = 5.3333333335
X_18 = 5.6666666667
X_19 = 6.0000000000
X_20 = 6.3333333333
X_21 = 6.6666666667
X_22 = 7.0000000000
X_23 = 7.3333333333
X_24 = 7.6666666667
X_25 = 8.0000000000
X_26 = 8.3333333333
X_27 = 8.6666666667
X_28 = 9.0000000000

```

X\_29 = 9.3333333333  
X\_30 = 9.6666666667  
X\_31 = 10.0000000000  
X\_32 = 10.3333333333  
X\_33 = 10.6666666667  
X\_34 = 11.0000000000  
X\_35 = 11.3333333331  
X\_36 = 11.6666666656  
X\_37 = 11.9999999950  
X\_38 = 12.3333333096  
X\_39 = 12.6666665528  
X\_40 = 12.9999994544  
X\_41 = 13.3333307192  
X\_42 = 13.6666541416  
X\_43 = 13.9999399890  
X\_44 = 14.3330458035  
X\_45 = 14.6652890285  
X\_46 = 14.9933993389  
X\_47 = 15.3017076660  
X\_48 = 15.5151389912  
X\_49 = 15.2739872898  
X\_50 = 12.8547974580