

NAME:IBEZIM FAVOUR
 MAT NO:16/ENG01/010
 DEPT:CHEMICAL ENGINEERING
 DATE:9TH MARCH 2019

commandwindow

clear

clc

format short g

B =[4; 20; -15; -3; 16; -27];

```
a=[1 1 -2 1 3 -1
    2 -1 1 2 1 -3
    1 3 -3 -1 2 1
    5 2 -1 -1 2 1
    -3 -1 2 3 1 3
    4 3 1 -6 -3 -2]
```

F1a =[a(2,1)/a(1,2)]

F2a=[a(3,1)/a(1,2)]

F3a=[a(4,1)/a(1,2)]

F4a=[a(5,1)/a(1,2)]

F5a=[a(6,1)/a(1,2)]

```
a =[1 1 3 -2 -1
    1 3 3 -1 3 -1]
```

```
    a(2,1)-(F1a*a(1,1))    a(2,2)-(F1a*a(1,2))    a(2,3)-
(F1a*a(1,3))    a(2,4)-(F1a*a(1,4))    a(2,5)-(F1a*a(1,5))
a(2,6)-(F1a*a(1,6))
```

```
    a(3,1)-(F2a*a(1,1))    a(3,2)-(F2a*a(1,2))    a(3,3)-
(F2a*a(1,3))    a(3,4)-(F2a*a(1,4))    a(3,5)-(F2a*a(1,5))
a(3,6)-(F2a*a(1,6))
```

```
    a(4,1)-(F3a*a(1,1))    a(4,2)-(F3a*a(1,2))    a(4,3)-
(F3a*a(1,3))    a(4,4)-(F3a*a(1,4))    a(4,5)-(F3a*a(1,5))
a(4,6)-(F3a*a(1,6))
```

```
    a(5,1)-(F4a*a(1,1))    a(5,2)-(F4a*a(1,2))    a(5,3)-
(F4a*a(1,3))    a(5,4)-(F4a*a(1,4))    a(5,5)-(F4a*a(1,5))
a(5,6)-(F4a*a(1,6))
```

```
a(6,1)-(F5a*a(1,1))    a(6,2)-(F5a*a(1,2))    a(6,3)-(F5a*a(1,3))
a(6,4)-(F5a*a(1,4))    a(6,5)-(F5a*a(1,5))
a(6,6)-(F5a*a(1,6)) ]
```

```
Aa=[1 1 -2 1 3 -1
    0 -3 5 0 -5 -1
    0 2 -1 -2 -1 2
    0 -3 9 -6 -13 6
    0 2 -4 6 10 0
    0 -1 9 -10 -15 2]
```

F2=[Aa(3,2)/Aa(2,2)]

F3=[Aa(4,2)/Aa(2,2)]

F4=[Aa(5,2)/Aa(2,2)]

F5=[Aa(6,2)/Aa(2,2)]

$$\begin{array}{r}
A2 = [1 \qquad \qquad \qquad 1 \qquad \qquad \qquad -2 \\
1 \qquad \qquad \qquad \qquad \qquad 3 \qquad \qquad \qquad -1 \\
0 \qquad \qquad \qquad \qquad \qquad -3 \qquad \qquad \qquad 5 \\
0 \qquad \qquad \qquad 5 \qquad \qquad \qquad -1 \\
0 \qquad \qquad \qquad Aa(3,2) - (F2 * Aa(2,2)) \qquad Aa(3,3) - (F2 * Aa(2,3)) \qquad Aa(3,4) - \\
(F2 * Aa(2,4)) \qquad Aa(3,5) - (F2 * Aa(2,5)) \qquad Aa(3,6) - (F2 * Aa(2,6)) \\
0 \qquad \qquad \qquad Aa(4,2) - (F3 * Aa(2,2)) \qquad Aa(4,3) - (F3 * Aa(2,3)) \qquad Aa(4,4) - \\
(F3 * Aa(2,4)) \qquad Aa(4,5) - (F3 * Aa(2,5)) \qquad Aa(4,6) - (F3 * Aa(2,6)) \\
0 \qquad \qquad \qquad Aa(5,2) - (F4 * Aa(2,2)) \qquad Aa(5,3) - (F4 * Aa(2,3)) \qquad Aa(5,4) - \\
(F4 * Aa(2,4)) \qquad Aa(5,5) - (F4 * Aa(2,5)) \qquad Aa(5,6) - (F4 * Aa(2,6)) \\
0 \qquad \qquad \qquad Aa(6,2) - (F5 * Aa(2,2)) \qquad Aa(6,3) - (F5 * Aa(2,3)) \qquad Aa(6,4) - \\
(F5 * Aa(2,4)) \qquad Aa(6,5) - (F5 * Aa(2,5)) \qquad Aa(6,6) - (F5 * Aa(2,6))]
\end{array}$$

$$\begin{array}{l}
b3aa = b3a - (F2 * b2a) \\
b4aa = b4a - (F3 * b2a) \\
b5aa = b5a - (F4 * b2a) \\
b6aa = b6a - (F5 * b2a)
\end{array}$$

$$Aaa = \begin{bmatrix} 1 & 1 & -2 & 1 & 3 & -1 \\
0 & -3 & 5 & 0 & -5 & -1 \\
0 & 0 & 7/3 & -2 & -13/3 & 4/3 \\
0 & 0 & 4 & -6 & -8 & 7 \\
0 & 0 & -2/3 & 6 & 20/3 & -2/3 \\
0 & 0 & 22/3 & -10 & -40/3 & 7/3 \end{bmatrix}$$

$$\begin{array}{l}
F33 = [Aaa(4,3) / Aaa(3,3)] \\
F44 = [Aaa(5,3) / Aaa(3,3)] \\
F55 = [Aaa(6,3) / Aaa(3,3)]
\end{array}$$

$$\begin{array}{r}
A3 = [1 \qquad \qquad \qquad 1 \qquad \qquad \qquad -2 \\
1 \qquad \qquad \qquad \qquad \qquad 3 \qquad \qquad \qquad -1 \\
0 \qquad \qquad \qquad \qquad \qquad -3 \qquad \qquad \qquad 5 \\
0 \qquad \qquad \qquad 5 \qquad \qquad \qquad -1 \\
0 \qquad \qquad \qquad \qquad \qquad 0 \qquad \qquad \qquad 2.3333 \\
-2 \qquad \qquad \qquad -4.3333 \qquad \qquad \qquad 1.3333 \\
0 \qquad \qquad \qquad 0 \qquad \qquad \qquad Aaa(4,3) - (F33 * Aaa(3,3)) \qquad Aaa(4,4) - \\
(F33 * Aaa(3,4)) \qquad Aaa(4,5) - (F33 * Aaa(3,5)) \qquad Aaa(4,6) - (F33 * Aaa(3,6)) \\
0 \qquad \qquad \qquad 0 \qquad \qquad \qquad Aaa(5,3) - (F44 * Aaa(3,3)) \qquad Aaa(5,4) - \\
(F44 * Aaa(3,4)) \qquad Aaa(5,5) - (F44 * Aaa(3,5)) \qquad Aaa(5,6) - (F44 * Aaa(3,6)) \\
0 \qquad \qquad \qquad 0 \qquad \qquad \qquad Aaa(6,3) - (F55 * Aaa(3,3)) \qquad Aaa(6,4) - \\
(F55 * Aaa(3,4)) \qquad Aaa(6,5) - (F55 * Aaa(3,5)) \qquad Aaa(6,6) - (F55 * Aaa(3,6))]
\end{array}$$

$$\begin{array}{l}
b4aaa = b4aa - (F33 * b3aa) \\
b5aaa = b5aa - (F44 * b3aa) \\
b6aaa = b6aa - (F55 * b3aa)
\end{array}$$

$$Aaaa = \begin{bmatrix} 1 & 1 & -2 & 1 & 3 & -1 \\
0 & -3 & 5 & 0 & -5 & -1 \\
0 & 0 & 7/3 & -2 & -13/3 & 4/3 \\
0 & 0 & 0 & -18/7 & -4/7 & 33/7 \end{bmatrix}$$

```

0 0 0 38/7 38/7 -2/7
0 0 0 -26/7 2/7 -13/7]
F444=[Aaaa(5,4)/Aaaa(4,4)]
F555=[Aaaa(6,4)/Aaaa(4,4)]
A4 =[1 1 -2
1 3 -1 5
0 5 -1 2.3333
-2 0 1.3333 0
2.5714 -0.57143 4.7143 0
0 0 0 0 Aaaa(5,4) -
(F444*Aaaa(4,4)) Aaaa(5,5) - (F444*Aaaa(4,5)) Aaaa(5,6) -
(F444*Aaaa(4,6)) 0 0 Aaaa(6,4) -
(F555*Aaaa(4,4)) Aaaa(6,5) - (F555*Aaaa(4,5)) Aaaa(6,6) -
(F555*Aaaa(4,6))]
b5aaaa =b5aaa-(F444*b4aaa)
b6aaaa =b6aaa-(F555*b4aaa)
Aaaaa=[1 1 -2 1 3 -1
0 -3 5 0 -5 -1
0 0 7/3 -2 -13/3 4/3
0 0 0 -18/7 -4/7 33/7
0 0 0 0 38/9 29/3
0 0 0 0 10/9 -26/3]
F5555=[Aaaaa(6,5)/Aaaaa(5,5)]
A5 =[1 -2 1 3 -1
0 -3 5 0 -5 -1
0 0 2.3333 -2 -4.333 1.333
0 0 0 -2.5714 -0.57143
4.7143 0 0 0 0
0 4.2222 0 9.6667
0 0 0 0 0
0 Aaaaa(6,5) - (F5555*Aaaaa(5,5)) Aaaaa(6,6) - (F5555*Aaaaa(5,6))]

b6aaaaaa =b6aaaa-(F5555*b5aaaa)
x6=b6aaaaaa/A5(6,6)
x5=(b5aaaa-(A5(5,6)*x6))/A5(5,5)
x4=(b4aaa-((Aaaa(4,5))*x5)-((Aaaa(4,6))*x6))/Aaaa(4,4)
x3=(b3aa-((Aaa(3,6))*x6)-((Aaa(3,5))*x5)-((Aaa(3,4))*x4))/Aaa(3,3)
x2=(b2a-(Aa(2,3)*x3)-(Aa(2,4)*x4)-(Aa(2,5)*x5)-(Aa(2,6)*x6))/Aa(2,2)
x1=(b1-(a(1,2)*x2)-(a(1,3)*x3)-(a(1,4)*x4)-(a(1,5)*x5)-(a(1,6)*x6))/a(1,1)

```

MATLAB SOLUTION

a =

```

1 1 -2 1 3 -1

```

2	-1	1	2	1	-3
1	3	-3	-1	2	1
5	2	-1	-1	2	1
-3	-1	2	3	1	3
4	3	1	-6	-3	-2

F1a =

2

F2a =

1

F3a =

5

F4a =

-3

F5a =

4

a =

1	1	-2	1	3	-1
0	-3	5	0	-5	-1
0	2	-1	-2	-1	2
0	-3	9	-6	-13	6
0	2	-4	6	10	0
0	-1	9	-10	-15	2

b2a =

12

b3a =

-19

b4a =

-23

b5a =

28

b6a =

-43

Aa =

1	1	-2	1	3	-1
0	-3	5	0	-5	-1
0	2	-1	-2	-1	2
0	-3	9	-6	-13	6
0	2	-4	6	10	0
0	-1	9	-10	-15	2

F2 =

-0.66667

F3 =

1

F4 =

-0.66667

F5 =

0.33333

A2 =

-1	1	1	-2	1	3
-1	0	-3	5	0	-5
1.3333	0	0	2.3333	-2	-4.3333
7	0	0	4	-6	-8
-0.66667	0	0	-0.66667	6	6.6667
2.3333	0	0	7.3333	-10	141

b3aa =

-11

b4aa =

-35

b5aa =

36

b6aa =

-47

Aaa =

-1	1	1	-2	1	3
-1	0	-3	5	0	-5
1.3333	0	0	2.3333	-2	-4.3333
7	0	0	4	-6	-8
-0.66667	0	0	-0.66667	6	6.6667
2.3333	0	0	7.3333	-10	-13.333

F33 =

1.7143

F44 =

-0.28571

F55 =

3.1429

A3 =

-1	1	1	-2	1	3
-1	0	-3	5	0	-5
1.3333	0	0	2.3333	-2	-4.3333
4.7143	0	0	0	-2.5714	-0.57143
-0.28571	0	0	0	5.4286	5.4286
-1.8571	0	0	0	-3.7143	0.28571

b4aaa =

-16.143

b5aaa =

32.857

b6aaa =

-12.429

Aaaa =

-1	1	1	-2	1	3
-1	0	-3	5	0	-5
1.3333	0	0	2.3333	-2	-4.3333
4.7143	0	0	0	-2.5714	-0.57143
-0.28571	0	0	0	5.4286	5.4286
-1.8571	0	0	0	-3.7143	0.28571

F444 =

-2.1111

F555 =

1.4444

A4 =

-1	1	1	-2	1	3
-1	0	-3	5	0	-5
1.3333	0	0	2.3333	-2	-4.3333
4.7143	0	0	0	-2.5714	-0.57143
9.6667	0	0	0	0	4.2222
-8.6667	0	0	0	0	1.1111

b5aaaa =

-1.2222

b6aaaa =

10.889

Aaaaa =

-1	1	1	-2	1	3
----	---	---	----	---	---

-1	0	-3	5	0	-5
1.3333	0	0	2.3333	-2	-4.3333
4.7143	0	0	0	-2.5714	-0.57143
9.6667	0	0	0	0	4.2222
-8.6667	0	0	0	0	1.1111

F5555 =

0.26316

A5 =

-1	1	1	-2	1	3
-1	0	-3	5	0	-5
1.3333	0	0	2.3333	-2	-4.3333
4.7143	0	0	0	-2.5714	-0.57143
9.6667	0	0	0	0	4.2222
-11.211	0	0	0	0	0

b6aaaaa =

11.211

$x_6 =$

-1

$x_5 =$

2

$x_4 =$

4

$x_3 =$

3

$x_2 =$

-2

$x_1 =$

0.99999

EXCEL INVERSE METHOD

						A			T	b
1	1	-2	1	3	-1	T1		4		
2	-1	1	2	1	-3	T2		20		
1	3	-3	-1	2	1	T3		-15		
5	2	-1	-1	2	1	T4		-3		
-3	-1	2	3	1	3	T5		16		
4	3	1	-6	-3	-2	T6		-27		
INV								T		
-		0.08450	0.19718	-	-					
0.30282	0.15493	7	3	0.10563	0.09859	T1		1		
	0.54460	0.81220	-	0.23474	0.10798					
-0.5493	1	7	0.21596	2	1	T2		-2		
0.33098	-	-	-	0.32863	0.25117					
6	0.03756	0.26291	0.00235	8	4	T3		3		
-	0.68544	0.79812	-	0.00234	-					
0.91549	6	2	0.08216	7	0.20892	T4		4		
1.09154	-	-	0.09154	0.18309	0.20422					
9	0.53521	0.74648	9	9	5	T5		2		
-	-	-	0.17840	0.02347						
0.15493	0.14554	0.01878	4	4	-0.0892	T6		-1		

GAUSS METHOD ON EXCEL

						A			T	B
1	1	-2	1	3	-1	T1		4		
2	-1	1	2	1	-3	T2		20		
1	3	-3	-1	2	1	T3		-15		
5	2	-1	-1	2	1	T4		-3		
-3	-1	2	3	1	3	T5		16		
4	3	1	-6	-3	-2	T6		-27		
						A			B	Factor
1	1	-2	1	3	-1			4	2	
0	-3	5	0	-5	-1			12	1	
0	2	-1	-2	-1	2			-19	5	
0	-3	9	-6	-13	6			-23	-3	
0	2	-4	6	10	0			28	4	
0	-1	9	-10	-15	2			-43		

			A		B	Factor
1	1	-2	1	3	-1	4 -0.66667
	-					
0	3	5	0	-5	-1	12 1
0	0	2.333333	-2	-4.333333	1.333333	-11
0	0	4	-6	-8	7	-35 -0.66667
0	0	-0.66667	6	6.666667	-0.66667	36 0.333333
0	0	7.333333	-10	-13.3333	2.333333	-47

			A		B	Factor
1	1	-2	1	3	-1	4 1.714286
	-					
0	3	5	0	-5	-1	12 -0.28571
0	0	2.333333	-2	-4.333333	1.333333	-11 3.142857
0	0	0	-2.57143	-0.57143	4.714286	-16.1429
0	0	0	5.428571	5.428571	-0.28571	32.85714
0	0	0	-3.71429	0.285714	-1.85714	-12.4286

			A		B	Factor
1	1	-2	1	3	-1	4 -2.11111
	-					
0	3	5	0	-5	-1	12 1.444444
0	0	2.33333	-2	-4.33333	1.33333	-11
0	0	0	-2.57143	-0.57143	4.71429	-16.1429
0	0	0	0	4.222222	9.666667	-1.22222
0	0	0	0	1.111111	-8.66667	10.88889

			A		B	Factor
1	1	-2	1	3	-1	4 0.263158
	-					
0	3	5	0	-5	-1	12
0	0	2.33333	-2	-4.33333	1.33333	-11
0	0	0	-2.57143	-0.57143	4.71429	-16.1429
0	0	0	0	4.22222	9.66667	-1.22222
0	0	0	0	0	-11.2105	11.21053

T6 -1
 T5 2.000001
 T4 4
 T3 2.999998

```
T2          -2
T1    0.999999
```

MATLAB INVERSE METHOD

```
commandwindow
clear
clc
format short g
B =[4; 20; -15; -3; 16; -27]
a= [ 1    1    -2    1    3    -1
     2   -1    1    2    1   -3
     1    3   -3   -1    2    1
     5    2   -1   -1    2    1
    -3   -1    2    3    1    3
     4    3    1   -6   -3   -2]
g = inv(a)
T =g*B
B =
```

```
4
20
-15
-3
16
-27
```

```
a =
     1     1    -2     1     3    -1
     2    -1     1     2     1    -3
     1     3    -3    -1     2     1
     5     2    -1    -1     2     1
    -3    -1     2     3     1     3
     4     3     1    -6    -3    -2
```


g =

-0.30282 0.15493 0.084507 0.19718 -0.10563 -
0.098592

-0.5493 0.5446 0.81221 -0.21596 0.23474
0.10798

0.33099 -0.037559 -0.26291 -0.0023474 0.32864
0.25117

-0.91549 0.68545 0.79812 -0.08216 0.0023474
-0.20892

1.0915 -0.53521 -0.74648 0.091549 0.1831
0.20423

-0.15493 -0.14554 -0.018779 0.1784 0.023474 -
0.089202

T =

1

-2

3

4

2

-1

MANUAL CALCULATION

NAME: IRRIZUM FAVOUR
DEPT: CHEMICAL ENGINEERING
MAT NO: 16/ENGR1010

Given $f(x) = e^{-0.5x}(4-x) - 2$
absolute error = 10^{-9}
interval given value = 0.5
- solution

$x = 0.5$
 $f(x) = e^{-0.5x}(4-x) - 2$
 $f'(x) = -0.5e^{-0.5x}(4-x) - \exp^{-0.5x}$
 $x_{i+1} = x_i - \frac{e^{-0.5x}(4-x) - 2}{-0.5e^{-0.5x}(4-x) - \exp^{-0.5x}}$

when $x = 0$
 $x_1 = 0.5 - \frac{e^{-0.5(0)}(4-0.5) - 2}{-0.5e^{-0.5(0)}(4-0.5) - \exp^{-0.5(0)}} = 0.7258027407$
 $x_1 = 0.5 - \frac{2.141702153}{-0.888790606} = 0.888790606$

$x_2 = 0.888790606 - \frac{e^{-0.5(0.888790606)}(4-0.888790606) - 2}{-0.5e^{-0.5(0.888790606)}(4-0.888790606) - \exp^{-0.5(0.888790606)}}$
 $x_2 = 0.888790606 - \frac{0.07814929794}{-1.696486281} = 0.8849559949$

$x_3 = 0.8849559949 - \frac{e^{-0.5(0.8849559949)}(4-0.8849559949) - 2}{-0.5e^{-0.5(0.8849559949)}(4-0.8849559949) - \exp^{-0.5(0.8849559949)}}$
 $x_3 = 0.8849559949 - \frac{1.236554066 \times 10^{-3}}{-1.648060768} = 0.885708605$

$x_4 = 0.885708605 - \frac{e^{-0.5(0.885708605)}(4-0.885708605) - 2}{-0.5e^{-0.5(0.885708605)}(4-0.885708605) - \exp^{-0.5(0.885708605)}}$
 $x_4 = 0.885708605 - \frac{1.926925825 \times 10^{-3}}{-1.64316423} = 0.8868812972$

$b_5' = -3 - \left(\frac{5}{1} \times 4\right) = -28$ $b_6' = 16 - \left(\frac{2}{1} \times 4\right)$

$A_2 = \begin{bmatrix} 1 & 1 & -2 & 1 & 2 & -1 & T_1 & 4 \\ 0 & -3 & 5 & 0 & -5 & -1 & T_2 & 12 \\ 0 & 2 & -1 & -2 & -1 & 2 & T_3 & -19 \\ 0 & -3 & 9 & -6 & -13 & 6 & T_4 & -23 \\ 0 & 2 & -4 & 6 & 10 & 0 & T_5 & 28 \\ 0 & -1 & 9 & -10 & -15 & 2 & T_6 & 43 \end{bmatrix}$

when $2/3$ is the new pivot element $\begin{matrix} -3/2 & 2/3 & -1/3 \\ 2 & -3 & 5 \\ -3 & 5 & -1 \\ 2 & -1 & -2 \\ -3 & 9 & -6 \\ 2 & -4 & 6 \\ -1 & 9 & -10 \end{matrix}$

$2 - \left(\frac{2}{3} \times 3\right) = -1$, $-1 - \left(\frac{2}{3} \times 5\right) = -\frac{14}{3}$, $-2 - \left(\frac{2}{3} \times 0\right) = -2$, $-1 - \left(\frac{2}{3} \times 5\right) = -\frac{14}{3}$, $2 - \left(\frac{2}{3} \times 1\right) = \frac{4}{3}$
 $-3 - \left(\frac{2}{3} \times 3\right) = -5$, $9 - \left(\frac{2}{3} \times 5\right) = \frac{13}{3}$, $-6 - \left(\frac{2}{3} \times 0\right) = -6$, $-3 - \left(\frac{2}{3} \times 5\right) = -\frac{14}{3}$, $6 - \left(\frac{2}{3} \times 1\right) = \frac{10}{3}$
 $2 - \left(\frac{2}{3} \times 3\right) = -2$, $-4 - \left(\frac{2}{3} \times 5\right) = -\frac{14}{3}$, $6 - \left(\frac{2}{3} \times 0\right) = 6$, $-1 - \left(\frac{2}{3} \times 5\right) = -\frac{14}{3}$, $0 - \left(\frac{2}{3} \times 1\right) = -\frac{2}{3}$
 $-1 - \left(\frac{2}{3} \times 3\right) = -3$, $9 - \left(\frac{2}{3} \times 5\right) = \frac{13}{3}$, $-10 - \left(\frac{2}{3} \times 0\right) = -10$, $-15 - \left(\frac{2}{3} \times 5\right) = -\frac{25}{3}$, $2 - \left(\frac{2}{3} \times 1\right) = \frac{4}{3}$

$b_3'' = -19 - \left(\frac{2}{3} \times 12\right) = -11$, $b_4'' = -23 - \left(\frac{2}{3} \times 12\right) = -25$
 $b_5'' = 28 - \left(\frac{2}{3} \times 12\right) = 20$, $b_6'' = 43 - \left(\frac{2}{3} \times 12\right) = 29$

$A_{22} = \begin{bmatrix} 1 & 1 & -2 & 1 & 2 & -1 & T_1 & 4 \\ 0 & -3 & 5 & 0 & -5 & -1 & T_2 & 12 \\ 0 & 0 & 7/3 & -2 & -14/3 & 4/3 & T_3 & -11 \\ 0 & 0 & 4 & -6 & -8 & 7 & T_4 & -25 \\ 0 & 0 & -1/3 & 6 & 10/3 & -2/3 & T_5 & 20 \\ 0 & 0 & 29/3 & -10 & -25/3 & 4/3 & T_6 & 29 \end{bmatrix}$

when $7/3$ is the new pivot element $\begin{matrix} 4/3 & -2/3 & -14/3 \\ 7 & -6 & -8 \\ -1/3 & 6 & 10/3 \\ 29/3 & -10 & -25/3 \end{matrix}$

$4 - \left(\frac{4}{3} \times 7\right) = -\frac{20}{3}$, $-2 - \left(\frac{4}{3} \times 6\right) = -6$, $-14 - \left(\frac{4}{3} \times 8\right) = -\frac{62}{3}$, $4 - \left(\frac{4}{3} \times 7\right) = -\frac{20}{3}$
 $-11 - \left(\frac{4}{3} \times 7\right) = -\frac{59}{3}$, $-25 - \left(\frac{4}{3} \times 6\right) = -37$, $20 - \left(\frac{4}{3} \times 8\right) = \frac{8}{3}$, $29 - \left(\frac{4}{3} \times 7\right) = \frac{11}{3}$

$$\frac{22}{7} - \left(\frac{22}{7} \times \frac{3}{7} \times \frac{7}{7}\right), -10 - \left(\frac{22}{7} \times \frac{3}{7} \times 2\right), -48 - \left(\frac{22}{7} \times \frac{3}{7} \times \frac{18}{7}\right), \frac{2}{7} - \left(\frac{22}{7} \times \frac{3}{7} \times \frac{3}{7}\right)$$

$$b_4^{III} = -35 - \left(\frac{4 \times 22}{7} \times 11\right) = -\frac{113}{7}, \quad b_5^{III} = 86 - \left(\frac{2 \times 22}{7} \times 11\right) = \frac{280}{7}$$

$$b_6^{III} = -47 - \left(\frac{22 \times 3}{7} \times 11\right) = -87$$

$$A_{aaaa} = \begin{bmatrix} 1 & 1 & -2 & 1 & 3 & -1 \\ 0 & -3 & 5 & 0 & -5 & -1 \\ 0 & 0 & \frac{7}{2} & -2 & -\frac{19}{2} & \frac{4}{3} \\ 0 & 0 & 0 & -\frac{13}{7} & -\frac{4}{7} & \frac{33}{7} \\ 0 & 0 & 0 & \frac{38}{7} & \frac{28}{7} & -\frac{2}{7} \\ 0 & 0 & 0 & -\frac{26}{7} & \frac{2}{7} & -\frac{11}{7} \end{bmatrix} \begin{matrix} T_1 \\ T_2 \\ T_3 \\ T_4 \\ T_5 \\ T_6 \end{matrix} = \begin{matrix} 4 \\ 12 \\ -11 \\ -\frac{113}{7} \\ -\frac{280}{7} \\ -87 \end{matrix}$$

$$\frac{22}{7} - \left(\frac{22}{7} \times \frac{7}{7} \times \frac{18}{7}\right), \frac{22}{7} - \left(\frac{22}{7} \times \frac{7}{7} \times \frac{4}{7}\right), \frac{2}{7} - \left(\frac{22 \times 7}{7} \times \frac{33}{7}\right)$$

$$-\frac{26}{7} - \left(\frac{26 \times 7}{7} \times \frac{18}{7}\right), \frac{2}{7} - \left(\frac{26 \times 7}{7} \times \frac{4}{7}\right), \frac{2}{7} - \left(\frac{26 \times 7}{7} \times \frac{33}{7}\right)$$

$$b_5^{IV} = \frac{280}{7} - \left(\frac{38 \times 7}{7} \times \frac{113}{7}\right) = -\frac{11}{9}$$

$$b_6^{IV} = -87 - \left(\frac{26 \times 7}{7} \times \frac{113}{7}\right) = \frac{98}{9}$$

$$A_{aaaa} = \begin{bmatrix} 1 & 1 & -2 & 1 & 3 & -1 \\ 0 & -3 & 5 & 0 & -5 & -1 \\ 0 & 0 & \frac{7}{2} & -2 & -\frac{19}{2} & \frac{4}{3} \\ 0 & 0 & 0 & -\frac{13}{7} & -\frac{4}{7} & \frac{33}{7} \\ 0 & 0 & 0 & \frac{38}{7} & \frac{28}{7} & -\frac{2}{7} \\ 0 & 0 & 0 & -\frac{26}{7} & \frac{2}{7} & -\frac{11}{7} \end{bmatrix} \begin{matrix} T_1 \\ T_2 \\ T_3 \\ T_4 \\ T_5 \\ T_6 \end{matrix} = \begin{matrix} 4 \\ 12 \\ -11 \\ -\frac{113}{7} \\ -\frac{280}{7} \\ -87 \end{matrix}$$

$$\frac{10}{9} - \left(\frac{10 \times 9}{9} \times \frac{38}{9}\right), -\frac{26}{9} - \left(\frac{10 \times 9}{9} \times \frac{29}{9}\right)$$

$$b_6^{IV} = \frac{98}{9} - \left(\frac{10 \times 9}{9} \times \frac{11}{9}\right) = \frac{213}{19}$$

$$\begin{bmatrix} 1 & 1 & -2 & 1 & 3 & -1 \\ 0 & -3 & 5 & 0 & -5 & -1 \\ 0 & 0 & \frac{7}{2} & -2 & -\frac{19}{2} & \frac{4}{3} \\ 0 & 0 & 0 & -\frac{13}{7} & -\frac{4}{7} & \frac{33}{7} \\ 0 & 0 & 0 & \frac{38}{7} & \frac{28}{7} & -\frac{2}{7} \\ 0 & 0 & 0 & -\frac{26}{7} & \frac{2}{7} & -\frac{11}{7} \end{bmatrix} \begin{matrix} T_1 \\ T_2 \\ T_3 \\ T_4 \\ T_5 \\ T_6 \end{matrix} = \begin{matrix} 4 \\ 12 \\ -11 \\ -\frac{113}{7} \\ -\frac{280}{7} \\ -87 \end{matrix}$$

$$a_1 T_1 + a_2 T_2 + a_3 T_3 + a_4 T_4 + a_5 T_5 + a_6 T_6 = b$$

$$a_1 T_1 + a_2 T_2 + a_3 T_3 + a_4 T_4 + a_5 T_5 + a_6 T_6 = b_2$$

$$a_3 T_1 + a_4 T_2 + a_5 T_3 + a_6 T_4 + a_7 T_5 + a_8 T_6 = b_3$$

$$a_4 T_1 + a_5 T_2 + a_6 T_3 + a_7 T_4 + a_8 T_5 + a_9 T_6 = b_4$$

$$a_5 T_1 + a_6 T_2 + a_7 T_3 + a_8 T_4 + a_9 T_5 + a_{10} T_6 = b_5$$

$$a_6 T_1 + a_7 T_2 + a_8 T_3 + a_9 T_4 + a_{10} T_5 + a_{11} T_6 = b_6$$

$$a_6 T_6 = b_6, \quad -\frac{213}{19} T_6 = \frac{213}{19}, \quad T_6 = -1$$

$$T_2 \text{ find } T_2, \frac{38}{7} T_2 + \frac{28}{7} T_6 = -11$$

$$\frac{38}{7} T_2 = -\frac{78}{7}, \quad T_2 = -2$$

$$-\frac{13}{7} T_4 - \frac{4}{7} T_5 + \frac{33}{7} T_6 = -\frac{113}{7}$$

$$-\frac{13}{7} T_4 - \frac{4}{7} T_5 + \frac{33}{7} (-1) = -\frac{113}{7}, \quad T_4 = 4$$

$$\frac{7}{2} T_3 - 2(4) - \frac{19}{2}(2) + \frac{4}{3}(-1) = -11$$

$$\frac{7}{2} T_3 - 18 = -11, \quad T_3 = 2$$

$$-3T_2 + 5T_3 + 0 - 5(2) - 1(-1) = 12$$

$$-3T_2 + 15 - 10 + 1 = 12, \quad T_2 = -2$$

$$T_1 + 1(-2) - 2(2) + 1(4) + 3(2) - 1(-1) = 4$$

$$T_1 + 8 + 4 + 6 + 12 + 1 = 4$$

$$T_1 = 1$$

$$T_1 = 1$$

$$T_2 = -2$$

$$T_3 = 2$$

$$T_4 = 4$$

$$T_5 = 2$$

$$T_6 = -1$$