

ADEBAJO-AKINPELU VICTOR

ELECTRICAL AND ELECTRONICS ENGINEERING

ENGINEERING MATHS ASSIGNMENT 3

17/ENG04/079

**SOLUTION: MATLAB CODE TO SOLVE A SYSTEM OF LINEAR EQUATIONS USING
GAUSSIAN ELIMINATION AND MATRIX INVERSE METHOD ON MATLAB**

```
commandwindow
```

```
clear
```

```
clc
```

```
close all
```

```
a= [ 1 1 -2 1 3 -1 4;  
    2 -1 1 2 1 -3 20;  
    1 3 -3 -1 2 1 -15;  
    5 2 -1 -1 2 1 -3;  
   -3 -1 2 3 1 3 16;  
    4 3 1 -6 -3 -2 -27]
```

```
z21= a(2,1)/a(1,1)
```

```
z31= a(3,1)/a(1,1)
```

```
z41= a(4,1)/a(1,1)
```

```
z51= a(5,1)/a(1,1)
```

```
z61= a(6,1)/a(1,1)
```

```
b=[ a(1,1) a(1,2) a(1,3) a(1,4) a(1,5) a(1,6) a(1,7);  
    a(2,1)-(z21*a(1,1)) a(2,2)-(z21*a(1,2)) a(2,3)-  
    (z21*a(1,3)) a(2,4)-(z21*a(1,4)) a(2,5)-(z21*a(1,5))  
    a(2,6)-(z21*a(1,6)) a(2,7)-(z21*a(1,7)) ;  
    a(3,1)-(z31*a(1,1)) a(3,2)-(z31*a(1,2)) a(3,3)-  
    (z31*a(1,3)) a(3,4)-(z31*a(1,4)) a(3,5)-(z31*a(1,5))  
    a(3,6)-(z31*a(1,6)) a(3,7)-(z31*a(1,7));  
    a(4,1)-(z41*a(1,1)) a(4,2)-(z41*a(1,2)) a(4,3)-  
    (z41*a(1,3)) a(4,4)-(z41*a(1,4)) a(4,5)-(z41*a(1,5))  
    a(4,6)-(z41*a(1,6)) a(4,7)-(z41*a(1,7));  
    a(5,1)-(z51*a(1,1)) a(5,2)-(z51*a(1,2)) a(5,3)-  
    (z51*a(1,3)) a(5,4)-(z51*a(1,4)) a(5,5)-(z51*a(1,5))  
    a(5,6)-(z51*a(1,6)) a(5,7)-(z51*a(1,7));
```

$a(6,1) - (z61*a(1,1)) \quad a(6,2) - (z61*a(1,2)) \quad a(6,3) -$
 $(z61*a(1,3)) \quad a(6,4) - (z61*a(1,4)) \quad a(6,5) - (z61*a(1,5))$
 $a(6,6) - (z61*a(1,6)) \quad a(6,7) - (z61*a(1,7))]$

$y3 = b(3,2)/b(2,2)$
 $y4 = b(4,2)/b(2,2)$
 $y5 = b(5,2)/b(2,2)$
 $y6 = b(6,2)/b(2,2)$

$c = [b(1,1) \quad b(1,2) \quad b(1,3) \quad b(1,4) \quad b(1,5) \quad b(1,6) \quad b(1,7);$
 $\quad b(2,1) \quad b(2,2) \quad b(2,3) \quad b(2,4) \quad b(2,5) \quad b(2,6) \quad b(2,7);$
 $\quad b(3,1) \quad b(3,2) - (y3*b(2,2)) \quad b(3,3) - (y3*b(2,3))$
 $b(3,4) - (y3*b(2,4)) \quad b(3,5) - (y3*b(2,5)) \quad b(3,6) - (y3*b(2,6))$
 $b(3,7) - (y3*b(2,7));$
 $\quad b(4,1) \quad b(4,2) - (y4*b(2,2)) \quad b(4,3) - (y4*b(2,3))$
 $b(4,4) - (y4*b(2,4)) \quad b(4,5) - (y4*b(2,5)) \quad b(4,6) - (y4*b(2,6))$
 $b(4,7) - (y4*b(2,7));$
 $\quad b(5,1) \quad b(5,2) - (y5*b(2,2)) \quad b(5,3) - (y5*b(2,3))$
 $b(5,4) - (y5*b(2,4)) \quad b(5,5) - (y5*b(2,5)) \quad b(5,6) - (y5*b(2,6))$
 $b(5,7) - (y5*b(2,7));$
 $\quad b(6,1) \quad b(6,2) - (y6*b(2,2)) \quad b(6,3) - (y6*b(2,3))$
 $b(6,4) - (y6*b(2,4)) \quad b(6,5) - (y6*b(2,5)) \quad b(6,6) - (y6*b(2,6))$
 $b(6,7) - (y6*b(2,7))]]$

$x4 = c(4,3)/c(3,3)$
 $x5 = c(5,3)/c(3,3)$
 $x6 = c(6,3)/c(3,3)$

$d = [c(1,1) \quad c(1,2) \quad c(1,3) \quad c(1,4) \quad c(1,5) \quad c(1,6) \quad c(1,7);$
 $\quad c(2,1) \quad c(2,2) \quad c(2,3) \quad c(2,4) \quad c(2,5) \quad c(2,6) \quad c(2,7);$
 $\quad c(3,1) \quad c(3,2) \quad c(3,3) \quad c(3,4) \quad c(3,5) \quad c(3,6) \quad c(3,7);$
 $\quad c(4,1) \quad c(4,2) \quad c(4,3) - (x4*c(3,3)) \quad c(4,4) - (x4*c(3,4))$
 $c(4,5) - (x4*c(3,5)) \quad c(4,6) - (x4*c(3,6)) \quad c(4,7) - (x4*c(3,7));$
 $\quad c(5,1) \quad c(5,2) \quad c(5,3) - (x5*c(3,3)) \quad c(5,4) - (x5*c(3,4))$
 $c(5,5) - (x5*c(3,5)) \quad c(5,6) - (x5*c(3,6)) \quad c(5,7) - (x5*c(3,7));$
 $\quad c(6,1) \quad c(6,2) \quad c(6,3) - (x6*c(3,3)) \quad c(6,4) - (x6*c(3,4))$
 $c(6,5) - (x6*c(3,5)) \quad c(6,6) - (x6*c(3,6)) \quad c(6,7) - (x6*c(3,7));]$
 $w5 = d(5,4)/d(4,4)$
 $w6 = d(6,4)/d(4,4)$

```

e= [d(1,1) d(1,2) d(1,3) d(1,4) d(1,5) d(1,6) d(1,7);
    d(2,1) d(2,2) d(2,3) d(2,4) d(2,5) d(2,6) d(2,7);
    d(3,1) d(3,2) d(3,3) d(3,4) d(3,5) d(3,6) d(3,7);
    d(4,1) d(4,2) d(4,3) d(4,4) d(4,5) d(4,6) d(4,7);
    d(5,1) d(5,2) d(5,3) d(5,4)-(w5*d(4,4)) d(5,5)-
(w5*d(4,5)) d(5,6)-(w5*d(4,6)) d(5,7)-(w5*d(4,7));
    d(6,1) d(6,2) d(6,3) d(6,4)-(w6*d(4,4)) d(6,5)-
(w6*d(4,5)) d(6,6)-(w6*d(4,6)) d(6,7)-(w6*d(4,7));]
v6=e(6,5)/e(5,5)

```

```

f=[e(1,1) e(1,2) e(1,3) e(1,4) e(1,5) e(1,6) e(1,7);
   e(2,1) e(2,2) e(2,3) e(2,4) e(2,5) e(2,6) e(2,7);
   e(3,1) e(3,2) e(3,3) e(3,4) e(3,5) e(3,6) e(3,7);
   e(4,1) e(4,2) e(4,3) e(4,4) e(4,5) e(4,6) e(4,7);
   e(5,1) e(5,2) e(5,3) e(5,4) e(5,5) e(5,6) e(5,7);
   e(6,1) e(6,2) e(6,3) e(6,4) e(6,5)-(v6*e(5,5)) e(6,6)-
(v6*e(5,6)) e(6,7)-(v6*e(5,7))]

```

```

x6= f(6,7)/f(6,6)
x5= (f(5,7) - f(5,6)*x6)/f(5,5)
x4= (f(4,7) - (f(4,6)*x6 + f(4,5)*x5))/f(4,4)
x3= (f(3,7) - (f(3,6)*x6 + f(3,5)*x5 + f(3,4)*x4))/f(3,3)
x2= (f(2,7) - (f(2,6)*x6 + f(2,5)*x5 + f(2,4)*x4 +
f(2,3)*x3))/f(2,2)
x1= (f(1,7) - (f(1,6)*x6 + f(1,5)*x5 + f(1,4)*x4 +
f(1,3)*x3 + f(1,2)*x2))/f(1,1)

```

```

%USING MATRIX INVERSE METHOD

```

```

aa= [ 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 ]
bb=[4 ; 20; -15; -3; 16; -27]

```

```

a1=inv(aa)

```

```

x= a1*bb

```

SOLUTION PAGE

a =

1	1	-2	1	3	-1	4
2	-1	1	2	1	-3	20
1	3	-3	-1	2	1	-15
5	2	-1	-1	2	1	-3
-3	-1	2	3	1	3	16
4	3	1	-6	-3	-2	-27

z₂₁ =

2

z₃₁ =

1

z₄₁ =

5

z₅₁ =

-3

z₆₁ =

4

b =

1	1	-2	1	3	-1	4
0	-3	5	0	-5	-1	12
0	2	-1	-2	-1	2	-19
0	-3	9	-6	-13	6	-23
0	2	-4	6	10	0	28
0	-1	9	-10	-15	2	-43

y3 =

-0.66667

y4 =

1

y5 =

-0.66667

y6 =

0.33333

c =

Columns 1 through 6

1	1	-2	1	3	-1
0	-3	5	0	-5	-1
0	0	2.3333	-2	-4.3333	1.3333
0	0	4	-6	-8	7

0	0	-0.66667	6	6.6667	-0.66667
0	0	7.3333	-10	-13.333	2.3333

Column 7

4
12
-11
-35
36
-47

x4 =

1.7143

x5 =

-0.28571

x6 =

3.1429

d =

Columns 1 through 6

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

0 0 0 -3.7143 0.28571 -1.8571

Column 7

4
12
-11
-16.143
32.857
-12.429

w5 =

-2.1111

w6 =

1.4444

e =

Columns 1 through 6

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

Column 7

4
12

-11
-16.143
-1.2222
10.889

v6 =

0.26316

f =

Columns 1 through 6

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

Column 7

4
12
-11
-16.143
-1.2222
11.211

x6 =

-1

x5 =

2

x4 =

4

x3 =

3

x2 =

-2

x1 =

1

aa =

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

bb =

4
20
-15
-3
16
-27

a1 =

-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

x =

1
-2
3
4
2
-1