

Question 1 [20 Marks]

If the model of a system having thermocouples measuring temperatures, T ($^{\circ}\text{C}$), at its different points is given by the set of expressions in Equation (1), estimate the values of the temperatures using:

$$\left\{ \begin{array}{l} T1 + T2 - 2T3 + T4 + 3T5 - T6 = 4 \\ 2T1 - T2 + T3 + 2T4 + T5 - 3T6 = 20 \\ T1 + 3T2 - 3T3 - T4 + 2T5 + T6 = -15 \\ 5T1 + 2T2 - T3 - T4 + 2T5 + T6 = -3 \\ -3T1 - T2 + 2T3 + 3T4 + T5 + 3T6 = 16 \\ 4T1 + 3T2 + T3 - 6T4 - 3T5 - 2T6 = -27 \end{array} \right\} \dots\dots\dots \text{Equation (1)}$$

- (a) Gauss elimination method manually (with the aid of calculator),
- (b) Gauss elimination method with the aid of Microsoft Excel,
- (c) Gauss elimination method with the aid of MATLAB,
- (d) matrix inverse method with the aid of Microsoft Excel, and
- (e) matrix inverse method with the aid of MATLAB.

Solution**A. Solution Gauss elimination method manually (with the aid of calculator)**

$$\left\{ \begin{array}{l} T1 + T2 - 2T3 + T4 + 3T5 - T6 = 4 \\ 2T1 - T2 + T3 + 2T4 + T5 - 3T6 = 20 \\ T1 + 3T2 - 3T3 - T4 + 2T5 + T6 = -15 \\ 5T1 + 2T2 - T3 - T4 + 2T5 + T6 = -3 \\ -3T1 - T2 + 2T3 + 3T4 + T5 + 3T6 = 16 \\ 4T1 + 3T2 + T3 - 6T4 - 3T5 - 2T6 = -27 \end{array} \right\} \dots\dots\dots \text{Equation (1)}$$

The matrix forms of Equation 1 are as follows:

$$\begin{bmatrix} 1 & 1 & -2 & 1 & 3 & -1 \\ 2 & -1 & 1 & 2 & 1 & -3 \\ 1 & 3 & -3 & -1 & 2 & 1 \\ 5 & 2 & -1 & -1 & 2 & 1 \\ -3 & -1 & 2 & 3 & 1 & 3 \\ 4 & 3 & 1 & -6 & -3 & -2 \end{bmatrix} \begin{bmatrix} T1 \\ T2 \\ T3 \\ T4 \\ T5 \\ T6 \end{bmatrix} = \begin{bmatrix} 4 \\ 20 \\ -15 \\ -3 \\ 16 \\ -27 \end{bmatrix}$$

By subtracting the product of the first pivot element of each column of row one and the pivot factor of each row from each element of rows 2 to 6, we get the following:

$$\begin{bmatrix} 1 & 1 & -2 & 1 & 3 & -1 \\ 0 & -3 & 5 & 0 & -5 & -1 \\ 0 & 2 & -1 & -2 & -1 & 2 \\ 0 & -3 & 9 & -6 & -13 & 6 \\ 0 & 2 & -4 & 6 & 10 & 0 \\ 0 & -1 & 9 & -10 & -15 & 2 \end{bmatrix} \begin{bmatrix} T1 \\ T2 \\ T3 \\ T4 \\ T5 \\ T6 \end{bmatrix} = \begin{bmatrix} 4 \\ 12 \\ -19 \\ -23 \\ 28 \\ -43 \end{bmatrix} \begin{bmatrix} \text{pivot factor} \\ f_{12} = \left(-\frac{2}{1}\right) = 2 \\ f_{13} = \left(\frac{1}{1}\right) = 1 \\ f_{14} = \left(\frac{5}{1}\right) = 5 \\ f_{15} = \left(-\frac{3}{1}\right) = -3 \\ f_{16} = \left(\frac{4}{1}\right) = 4 \end{bmatrix}$$

By subtracting the product of the second pivot element of each column of row two and the pivot factor of each row from each element of rows 3 to 6, we get the following:

$$\begin{bmatrix} 1 & 1 & -2 & 1 & 3 & -1 \\ 0 & -3 & 5 & 0 & -5 & -1 \\ 0 & 0 & \frac{7}{3} & -2 & -\frac{13}{3} & \frac{4}{3} \\ 0 & 0 & 4 & -6 & -8 & 7 \\ 0 & 0 & -\frac{2}{3} & 6 & \frac{20}{3} & -\frac{2}{3} \\ 0 & 0 & \frac{22}{3} & -10 & -\frac{40}{3} & \frac{7}{3} \end{bmatrix} \begin{bmatrix} T1 \\ T2 \\ T3 \\ T4 \\ T5 \\ T6 \end{bmatrix} = \begin{bmatrix} 4 \\ 12 \\ -11 \\ -35 \\ 36 \\ -47 \end{bmatrix} \begin{bmatrix} f_{23} = \left(\frac{2}{-3}\right) = -\frac{2}{3} \\ f_{24} = \left(\frac{-3}{-3}\right) = 1 \\ f_{25} = \left(\frac{2}{-3}\right) = -\frac{2}{3} \\ f_{26} = \left(\frac{-1}{-3}\right) = \frac{1}{3} \end{bmatrix}$$

By subtracting the product of the third pivot element of each column of row three and the pivot factor of each row from each element of rows 4 to 6, we get the following:

$$\begin{bmatrix} 1 & 1 & -2 & 1 & 3 & -1 \\ 0 & -3 & 5 & 0 & -5 & -1 \\ 0 & 0 & \frac{7}{3} & -2 & -\frac{13}{3} & \frac{4}{3} \\ 0 & 0 & 0 & -\frac{18}{7} & -\frac{4}{7} & \frac{33}{7} \\ 0 & 0 & 0 & \frac{38}{7} & \frac{38}{7} & -\frac{2}{7} \\ 0 & 0 & 0 & -\frac{26}{7} & \frac{2}{7} & -\frac{13}{7} \end{bmatrix} \begin{bmatrix} T1 \\ T2 \\ T3 \\ T4 \\ T5 \\ T6 \end{bmatrix} = \begin{bmatrix} 4 \\ 12 \\ -11 \\ -\frac{113}{7} \\ \frac{230}{7} \\ -\frac{87}{7} \end{bmatrix} \begin{bmatrix} \text{pivot factor} \\ f_{34} = \left(\frac{4}{7/3}\right) = \frac{12}{7} \\ f_{35} = \left(-\frac{\frac{2}{3}}{7/3}\right) = -\frac{2}{7} \\ f_{36} = \left(\frac{\frac{22}{3}}{7/3}\right) = \frac{22}{7} \end{bmatrix}$$

By subtracting the product of the fourth pivot element of each column of row four and the pivot factor of each row from each element of rows 5 to 6, we get the following:

$$\begin{bmatrix} 1 & 1 & -2 & 1 & 3 & -1 \\ 0 & -3 & 5 & 0 & -5 & -1 \\ 0 & 0 & \frac{7}{3} & -2 & -\frac{13}{3} & \frac{4}{3} \\ 0 & 0 & 0 & -\frac{18}{7} & -\frac{4}{7} & \frac{33}{7} \\ 0 & 0 & 0 & 0 & \frac{38}{9} & \frac{29}{3} \\ 0 & 0 & 0 & 0 & \frac{10}{9} & -\frac{26}{3} \end{bmatrix} \begin{bmatrix} T1 \\ T2 \\ T3 \\ T4 \\ T5 \\ T6 \end{bmatrix} = \begin{bmatrix} 4 \\ 12 \\ -11 \\ -\frac{113}{7} \\ -\frac{11}{9} \\ \frac{98}{9} \end{bmatrix} \begin{bmatrix} \text{pivot factor} \\ f_{45} = \left(\frac{\frac{38}{7}}{-\frac{18}{7}}\right) = -\frac{19}{9} \\ f_{46} = \left(\frac{\frac{26}{7}}{-\frac{18}{7}}\right) = \frac{13}{9} \end{bmatrix}$$

By subtracting the product of the fourth pivot element of each column of row fifth and the pivot factor of each row from each element of rows 6, we get the following:

$$\begin{bmatrix} 1 & 1 & -2 & 1 & 3 & -1 \\ 0 & -3 & 5 & 0 & -5 & -1 \\ 0 & 0 & \frac{7}{3} & -2 & -\frac{13}{3} & \frac{4}{3} \\ 0 & 0 & 0 & -\frac{18}{7} & -\frac{4}{7} & \frac{33}{7} \\ 0 & 0 & 0 & 0 & \frac{38}{9} & \frac{29}{3} \\ 0 & 0 & 0 & 0 & 0 & -\frac{213}{19} \end{bmatrix} \begin{bmatrix} T1 \\ T2 \\ T3 \\ T4 \\ T5 \\ T6 \end{bmatrix} = \begin{bmatrix} 4 \\ 12 \\ -11 \\ -\frac{113}{7} \\ -\frac{11}{9} \\ \frac{213}{19} \end{bmatrix} \begin{bmatrix} \text{pivot factor} \\ f_{56} = \left(\frac{\frac{10}{9}}{\frac{38}{9}}\right) = \frac{5}{19} \end{bmatrix}$$

$$\text{Hence, } -\frac{213}{19} T6 = \frac{213}{19}$$

$$T6 = -1$$

$$\frac{38}{9}T5 + \frac{29}{3}T6 = \frac{-11}{9}$$

$$T5 = ((\frac{-11}{9} - \frac{29}{3}(-1))/(\frac{38}{9})) = 2$$

$$-\frac{18}{7}T4 + -\frac{4}{7}T5 + \frac{33}{7}T6 = -\frac{113}{7}$$

$$T4 = ((-\frac{113}{7} - (\frac{4}{7}(2) - \frac{33}{7}(-1)))/(-\frac{18}{7})) = 4$$

$$(\frac{7}{3})T3 + (-2)T4 + (-\frac{13}{3})T5 + (\frac{4}{3})T6 = -11$$

$$T3 = ((-11 - ((-2)(4) + (-\frac{13}{3})(2) + (\frac{4}{3})(-1)))/(\frac{7}{3})) = 3$$

$$-3T2 + 5T3 + (0)T4 - 5T5 - T6 = 12$$

$$T2 = ((12 - (5(3) + (0)(4) - 5(2) - (-1)))/-3) = -2$$

$$T1 + T2 - 2T3 + T4 + 3T5 - T6 = 4$$

$$T1 = ((4 - ((-2) - 2(3) + (4) + 3(2) - (-1)))/1) = 1$$

Therefore, the solution of the sets of equations in matrix form is:

$$\begin{bmatrix} T1 \\ T2 \\ T3 \\ T4 \\ T5 \\ T6 \end{bmatrix} = \begin{bmatrix} 1 \\ -2 \\ 3 \\ 4 \\ 2 \\ -1 \end{bmatrix}$$

B. Solution using Gauss elimination method with the aid of Microsoft Excel

16ENG04026ENG382ASSIGN3.docx - Microsoft Excel

	A	B	C	D	E	F	G	H	I
1	SOLUTION USING GAUSS ELIMINATION METHOD								
2	A						T	B	
3	1	1	-2	1	3	-1	T1	4	
4	2	-1	1	2	1	-3	T2	20	
5	1	3	-3	-1	2	1	T3	-15	
6	5	2	-1	-1	2	1	T4	-3	
7	-3	-1	2	3	1	3	T5	16	
8	4	3	1	-6	-3	-2	T6	-27	
9									
10	A						T	B	FACTOR
11	=A3	=B3	=C3	=D3	=E3	=F3	T1	=H3	
12	=A4-\$I12*\$A\$3	=B4-\$I12*\$B\$3	=C4-\$I12*\$C\$3	=D4-\$I12*\$D\$3	=E4-\$I12*\$E\$3	=F4-\$I12*\$F\$3	T2	=H4-\$I12*\$H\$3	=A4/\$A\$3
13	=A5-\$I13*\$A\$3	=B5-\$I13*\$B\$3	=C5-\$I13*\$C\$3	=D5-\$I13*\$D\$3	=E5-\$I13*\$E\$3	=F5-\$I13*\$F\$3	T3	=H5-\$I13*\$H\$3	=A5/\$A\$3
14	=A6-\$I14*\$A\$3	=B6-\$I14*\$B\$3	=C6-\$I14*\$C\$3	=D6-\$I14*\$D\$3	=E6-\$I14*\$E\$3	=F6-\$I14*\$F\$3	T4	=H6-\$I14*\$H\$3	=A6/\$A\$3
15	=A7-\$I15*\$A\$3	=B7-\$I15*\$B\$3	=C7-\$I15*\$C\$3	=D7-\$I15*\$D\$3	=E7-\$I15*\$E\$3	=F7-\$I15*\$F\$3	T5	=H7-\$I15*\$H\$3	=A7/\$A\$3
16	=A8-\$I16*\$A\$3	=B8-\$I16*\$B\$3	=C8-\$I16*\$C\$3	=D8-\$I16*\$D\$3	=E8-\$I16*\$E\$3	=F8-\$I16*\$F\$3	T6	=H8-\$I16*\$H\$3	=A8/\$A\$3
17									
18	A						T	B	FACTOR
19	=A11	=B11	=C11	=D11	=E11	=F11	T1	=H11	
20	=\$A4-\$I12*\$A\$3	=B4-\$I12*\$B\$3	=C12-\$I20*\$C\$3	=D12-\$I20*\$D\$3	=E12-\$I20*\$E\$3	=F12-\$I20*\$F\$3	T2	=H12-\$I20*\$H\$3	
21	=\$A5-\$I13*\$A\$3	=B13-\$I21*\$B\$12	=C13-\$I21*\$C\$12	=D13-\$I21*\$D\$12	=E13-\$I21*\$E\$12	=F13-\$I21*\$F\$12	T3	=H13-\$I21*\$H\$12	=\$B13/\$B\$12
22	=\$A6-\$I14*\$A\$3	=B14-\$I22*\$B\$12	=C14-\$I22*\$C\$12	=D14-\$I22*\$D\$12	=E14-\$I22*\$E\$12	=F14-\$I22*\$F\$12	T4	=H14-\$I22*\$H\$12	=\$B14/\$B\$12
23	=\$A7-\$I15*\$A\$3	=B15-\$I23*\$B\$12	=C15-\$I23*\$C\$12	=D15-\$I23*\$D\$12	=E15-\$I23*\$E\$12	=F15-\$I23*\$F\$12	T5	=H15-\$I23*\$H\$12	=\$B15/\$B\$12
24	=\$A8-\$I16*\$A\$3	=B16-\$I24*\$B\$12	=C16-\$I24*\$C\$12	=D16-\$I24*\$D\$12	=E16-\$I24*\$E\$12	=F16-\$I24*\$F\$12	T6	=H16-\$I24*\$H\$12	=\$B16/\$B\$12
25									

27	A						T	B	FACTOR
28	=A11	=B11	=C11	=D11	=E11	=F11	T1	=H11	
29	=A4-\$I12*A\$3	=B4-\$I12*B\$3	=C4-\$I12*C\$3	=D4-\$I12*D\$3	=E4-\$I12*E\$3	=F4-\$I12*F\$3	T2	=H4-\$I12*H\$3	
30	=A5-\$I13*A\$3	=B13-\$I21*B\$12	=C13-\$I21*C\$12	=D13-\$I21*D\$12	=E13-\$I21*E\$12	=F13-\$I21*F\$12	T3	=H13-\$I21*H\$12	
31	=A6-\$I14*A\$3	=B14-\$I22*B\$12	=C22-\$I31*C\$21	=D22-\$I31*D\$21	=E22-\$I31*E\$21	=F22-\$I31*F\$21	T4	=H22-\$I31*H\$21	=C22/\$C\$21
32	=A7-\$I15*A\$3	=B15-\$I23*B\$12	=C23-\$I32*C\$21	=D23-\$I32*D\$21	=E23-\$I32*E\$21	=F23-\$I32*F\$21	T5	=H23-\$I32*H\$21	=C23/\$C\$21
33	=A8-\$I16*A\$3	=B16-\$I24*B\$12	=C24-\$I33*C\$21	=D24-\$I33*D\$21	=E24-\$I33*E\$21	=F24-\$I33*F\$21	T6	=H24-\$I33*H\$21	=C24/\$C\$21
34									
35	A						T	B	FACTOR
36	=A28	=B28	=C28	=D28	=E28	=F28	T1	=H28	
37	=A4-\$I12*A\$3	=B4-\$I12*B\$3	=C4-\$I12*C\$3	=D4-\$I12*D\$3	=E4-\$I12*E\$3	=F4-\$I12*F\$3	T2	=H4-\$I12*H\$3	
38	=A5-\$I13*A\$3	=B13-\$I21*B\$12	=C13-\$I21*C\$12	=D13-\$I21*D\$12	=E13-\$I21*E\$12	=F13-\$I21*F\$12	T3	=H13-\$I21*H\$12	
39	=A6-\$I14*A\$3	=B14-\$I22*B\$12	=C22-\$I31*C\$21	=D22-\$I31*D\$21	=E22-\$I31*E\$21	=F22-\$I31*F\$21	T4	=H22-\$I31*H\$21	
40	=A7-\$I15*A\$3	=B15-\$I23*B\$12	=C23-\$I32*C\$21	=D32-\$I40*D\$31	=E32-\$I40*E\$31	=F32-\$I40*F\$31	T5	=H32-\$I40*H\$31	=D32/D31
41	=A8-\$I16*A\$3	=B16-\$I24*B\$12	=C24-\$I33*C\$21	=D33-\$I41*D\$31	=E33-\$I41*E\$31	=F33-\$I41*F\$31	T6	=H33-\$I41*H\$31	=D33/D31
42									
43	A						T	B	FACTOR
44	=A36	=B36	=C36	=D36	=E36	=F36	T1	=H36	
45	=A4-\$I12*A\$3	=B4-\$I12*B\$3	=C4-\$I12*C\$3	=D4-\$I12*D\$3	=E4-\$I12*E\$3	=F4-\$I12*F\$3	T2	=H4-\$I12*H\$3	
46	=A5-\$I13*A\$3	=B13-\$I21*B\$12	=C13-\$I21*C\$12	=D13-\$I21*D\$12	=E13-\$I21*E\$12	=F13-\$I21*F\$12	T3	=H13-\$I21*H\$12	
47	=A6-\$I14*A\$3	=B14-\$I22*B\$12	=C22-\$I31*C\$21	=D22-\$I31*D\$21	=E22-\$I31*E\$21	=F22-\$I31*F\$21	T4	=H22-\$I31*H\$21	
48	=A7-\$I15*A\$3	=B15-\$I23*B\$12	=C23-\$I32*C\$21	=D32-\$I40*D\$31	=E32-\$I40*E\$31	=F32-\$I40*F\$31	T5	=H32-\$I40*H\$31	
49	=A8-\$I16*A\$3	=B16-\$I24*B\$12	=C24-\$I33*C\$21	=D33-\$I41*D\$31	=E41-\$I49*E\$40	=F41-\$I49*F\$40	T6	=H41-\$I49*H\$40	=E41/E40
50									
51									

ANSWERS	T
T1	=(H44-(B44*K45+C44*K46+D44*K47+E44*K48+F44*K49))/A44
T2	=(H45-(C45*K46+D45*K47+E45*K48+F45*K49))/B45
T3	=(H46-(D46*K47+E46*K48+F46*K49))/C46
T4	=(H47-(E47*K48+F47*K49))/D47
T5	=(H48-F48*K49)/E48
T6	=H49/F49

FIGURE B1: FORMULAE FOR THE SOLUTION

fx

Insert Function

Σ

AutoSum

Recently Used

Financial

Logical

Text

Date & Time

Lookup & Reference

Math & Trig

More Functions

Name Manager

Define Name

Use in Formula

Create from Selection

Defined Names

Function Library

K17

fx

	A	B	C	D	E	F	G	H	I	J
1	SOLUTION USING GAUSS ELIMINATION METHOD									
2	A						T	B		
3	1	1	-2	1	3	-1	T1	4		
4	2	-1	1	2	1	-3	T2	20		
5	1	3	-3	-1	2	1	T3	-15		
6	5	2	-1	-1	2	1	T4	-3		
7	-3	-1	2	3	1	3	T5	16		
8	4	3	1	-6	-3	-2	T6	-27		
9										
10	A						T	B	FACTOR	
11	1	1	-2	1	3	-1	T1	4		
12	0	-3	5	0	-5	-1	T2	12	2	
13	0	2	-1	-2	-1	2	T3	-19	1	
14	0	-3	9	-6	-13	6	T4	-23	5	
15	0	2	-4	6	10	0	T5	28	-3	
16	0	-1	9	-10	-15	2	T6	-43	4	
17										
18	A						T	B	FACTOR	
19	1	1	-2	1	3	-1	T1	4		
20	0	-3	5	0	-5	-1	T2	12		
21	0	0	2.333333333	-2	-4.333333333	1.333333333	T3	-11	-0.666666667	
22	0	0	4	-6	-8	7	T4	-35	1	
23	0	0	-0.666666667	6	6.666666667	-0.666666667	T5	36	-0.666666667	
24	0	0	7.333333333	-10	-13.33333333	2.333333333	T6	-47	0.333333333	
25										

27	A						T	B	FACTOR			
28	1	1	-2	1	3	-1	T1	4				
29	0	-3	5	0	-5	-1	T2	12				
30	0	0	2.333333333	-2	-4.333333333	1.333333333	T3	-11				
31	0	0	0	-2.571428571	-0.571428571	4.714285714	T4	-16.14285714	1.714285714			
32	0	0	0	5.428571429	5.428571429	-0.285714286	T5	32.85714286	-0.285714286			
33	0	0	0	-3.714285714	0.285714286	-1.857142857	T6	-12.42857143	3.142857143			
34												
35	A						T	B	FACTOR			
36	1	1	-2	1	3	-1	T1	4				
37	0	-3	5	0	-5	-1	T2	12				
38	0	0	2.333333333	-2	-4.333333333	1.333333333	T3	-11				
39	0	0	0	-2.571428571	-0.571428571	4.714285714	T4	-16.14285714				
40	0	0	0	0	4.222222222	9.666666667	T5	-1.222222222	-2.111111111			
41	0	0	0	0	1.111111111	-8.666666667	T6	10.88888889	1.444444444			
42												
43	A						T	B	FACTOR	ANSWERS	T	
44	1	1	-2	1	3	-1	T1	4		T1	1	
45	0	-3	5	0	-5	-1	T2	12		T2	-2	
46	0	0	2.333333333	-2	-4.333333333	1.333333333	T3	-11		T3	3	
47	0	0	0	-2.571428571	-0.571428571	4.714285714	T4	-16.14285714		T4	4	
48	0	0	0	0	4.222222222	9.666666667	T5	-1.222222222		T5	2	
49	0	0	0	0	0	-11.21052632	T6	11.21052632	0.263157895	T6	-1	
50												

Sheet1 Sheet2 Sheet3

Ready

FIGURE B2: RESULTS OF THE EXCEL FORMULAE

C. Solution using Gauss elimination method with the aid of MATLAB

MATLAB R2018a

The MATLAB R2018a interface is shown with the Editor window open to the file `C:\Users\BROOKSTONE SCHOOL\Documents\MATLAB\ENG382assign3C.m`. The script contains the following code:

```

1  commandwindow
2  clear
3  clc
4  close all
5  format short g
6  A = [1 1 -2 1 3 -1
7      2 -1 1 2 1 -3
8      1 3 -3 -1 2 1
9      5 2 -1 -1 2 1
10     -3 -1 2 3 1 3
11     4 3 1 -6 -3 -2];
12  A = [A(1,1), A(1,2), A(1,3), A(1,4), A(1,5) A(1,6)
13      A(2,1), A(2,2), A(2,3), A(2,4), A(2,5) A(2,6)
14      A(3,1), A(3,2), A(3,3), A(3,4), A(3,5) A(3,6)
15      A(4,1), A(4,2), A(4,3), A(4,4), A(4,5) A(4,6)
16      A(5,1), A(5,2), A(5,3), A(5,4), A(5,5) A(5,6)
17      A(6,1), A(6,2), A(6,3), A(6,4), A(6,5) A(6,6)];
18  B = [4
19      20
20      -15
21      -3
22      16
23      -27];

```

The Workspace window shows the following variables:

Name	Value
A	6x6 double
B	[4;20;-15;-3;16;-27]
C	6x6 double
D	[4;12;-19;-23;28;-431]

16eng06065.m
 ASSIGNMENT.m
 EEE235Graph.m
 ENG382assign2.m
 ENG382assign3.asv
 ENG382assign3.m
 ENG382assign3C.m
 ENG382assign3d.m
 ENG382assign3E.m
 ENG 381 Assign 1 question 2.m
 Ex1.m
 Ex2.m
 Ex2.mat
 Ex3.m
 Ex3Isaiah.m
 Ex3Isaiahassignment.m

Details

Workspace

Name	Value

```

25 - B = [B(1,1)
26       B(2,1)
27       B(3,1)
28       B(4,1)
29       B(5,1)
30       B(6,1)]
31
32
33 - f12 = A(2,1)/A(1,1)
34 - f13 = A(3,1)/A(1,1)
35 - f14 = A(4,1)/A(1,1)
36 - f15 = A(5,1)/A(1,1)
37 - f16 = A(6,1)/A(1,1)
38
39 - C = [A(1,1), A(1,2), A(1,3), A(1,4), A(1,5) A(1,6)
40       A(2,1)-f12*A(1,1), A(2,2)-f12*A(1,2), A(2,3)-f12*A(1,3), A(2,4)-f12*A(1,4), A(2,5)-f12*A(1,5), A(2,6)-f12*A(1,6)
41       A(3,1)-f13*A(1,1), A(3,2)-f13*A(1,2), A(3,3)-f13*A(1,3), A(3,4)-f13*A(1,4), A(3,5)-f13*A(1,5), A(3,6)-f13*A(1,6)
42       A(4,1)-f14*A(1,1), A(4,2)-f14*A(1,2), A(4,3)-f14*A(1,3), A(4,4)-f14*A(1,4), A(4,5)-f14*A(1,5), A(4,6)-f14*A(1,6)
43       A(5,1)-f15*A(1,1), A(5,2)-f15*A(1,2), A(5,3)-f15*A(1,3), A(5,4)-f15*A(1,4), A(5,5)-f15*A(1,5), A(5,6)-f15*A(1,6)
44       A(6,1)-f16*A(1,1), A(6,2)-f16*A(1,2), A(6,3)-f16*A(1,3), A(6,4)-f16*A(1,4), A(6,5)-f16*A(1,5), A(6,6)-f16*A(1,6)
45       ]
  
```

16eng06065.m
 ASSIGNMENT.m
 EEE235Graph.m
 ENG382assign2.m
 ENG382assign3.asv
 ENG382assign3.m
 ENG382assign3C.m
 ENG382assign3d.m
 ENG382assign3E.m
 ENG 381 Assign 1 question 2.m
 Ex1.m
 Ex2.m
 Ex2.mat
 Ex3.m
 Ex3Isaiah.m
 Ex3Isaiahassignment.m

Details

Workspace

Name	Value

```

47 - D = [B(1,1)
48       B(2,1)-f12*B(1,1)
49       B(3,1)-f13*B(1,1)
50       B(4,1)-f14*B(1,1)
51       B(5,1)-f15*B(1,1)
52       B(6,1)-f16*B(1,1)]
53
54
55 - f23 = C(3,2)/C(2,2)
56 - f24 = C(4,2)/C(2,2)
57 - f25 = C(5,2)/C(2,2)
58 - f26 = C(6,2)/C(2,2)
59
60 - E = [C(1,1), C(1,2), C(1,3), C(1,4), C(1,5) C(1,6)
61       C(2,1), C(2,2), C(2,3), C(2,4), C(2,5) C(2,6)
62       C(3,1), C(3,2)-f23*C(2,2), C(3,3)-f23*C(2,3), C(3,4)-f23*C(2,4), C(3,5)-f23*C(2,5), C(3,6)-f23*C(2,6)
63       C(4,1), C(4,2)-f24*C(2,2), C(4,3)-f24*C(2,3), C(4,4)-f24*C(2,4), C(4,5)-f24*C(2,5), C(4,6)-f24*C(2,6)
64       C(5,1), C(5,2)-f25*C(2,2), C(5,3)-f25*C(2,3), C(5,4)-f25*C(2,4), C(5,5)-f25*C(2,5), C(5,6)-f25*C(2,6)
65       C(6,1), C(6,2)-f26*C(2,2), C(6,3)-f26*C(2,3), C(6,4)-f26*C(2,4), C(6,5)-f26*C(2,5), C(6,6)-f26*C(2,6)
66       ]
67 - F = [D(1,1)
68       D(2,1)
69       D(3,1)-f23*D(2,1)
70       D(4,1)-f24*D(2,1)
71       D(5,1)-f25*D(2,1)
72       D(6,1)-f26*D(2,1)]
  
```

```

16eng06065.m
ASSIGNMENT.m
EEE235Graph.m
ENG382assign2.m
ENG382assign3.asv
ENG382assign3.m
ENG382assign3C.m
ENG382assign3d.m
ENG382assign3E.m
ENG 381 Assign 1 question 2.m
Ex1.m
Ex2.m
Ex2.mat
Ex3.m
Ex3Isaiah.m
Ex3Isaiahassignment.m

Details
Workspace
Name Value

16eng06065.m
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EEE235Graph.m
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ENG382assign3.asv
ENG382assign3.m
ENG382assign3C.m
ENG382assign3d.m
ENG382assign3E.m
ENG 381 Assign 1 question 2.m
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Ex2.m
Ex2.mat
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16eng06065.m
ASSIGNMENT.m
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ENG382assign2.m
ENG382assign3.asv
ENG382assign3.m
ENG382assign3C.m
ENG382assign3d.m
ENG382assign3E.m
ENG 381 Assign 1 question 2.m
Ex1.m
Ex2.m
Ex2.mat
Ex3.m
Ex3Isaiah.m
Ex3Isaiahassignment.m

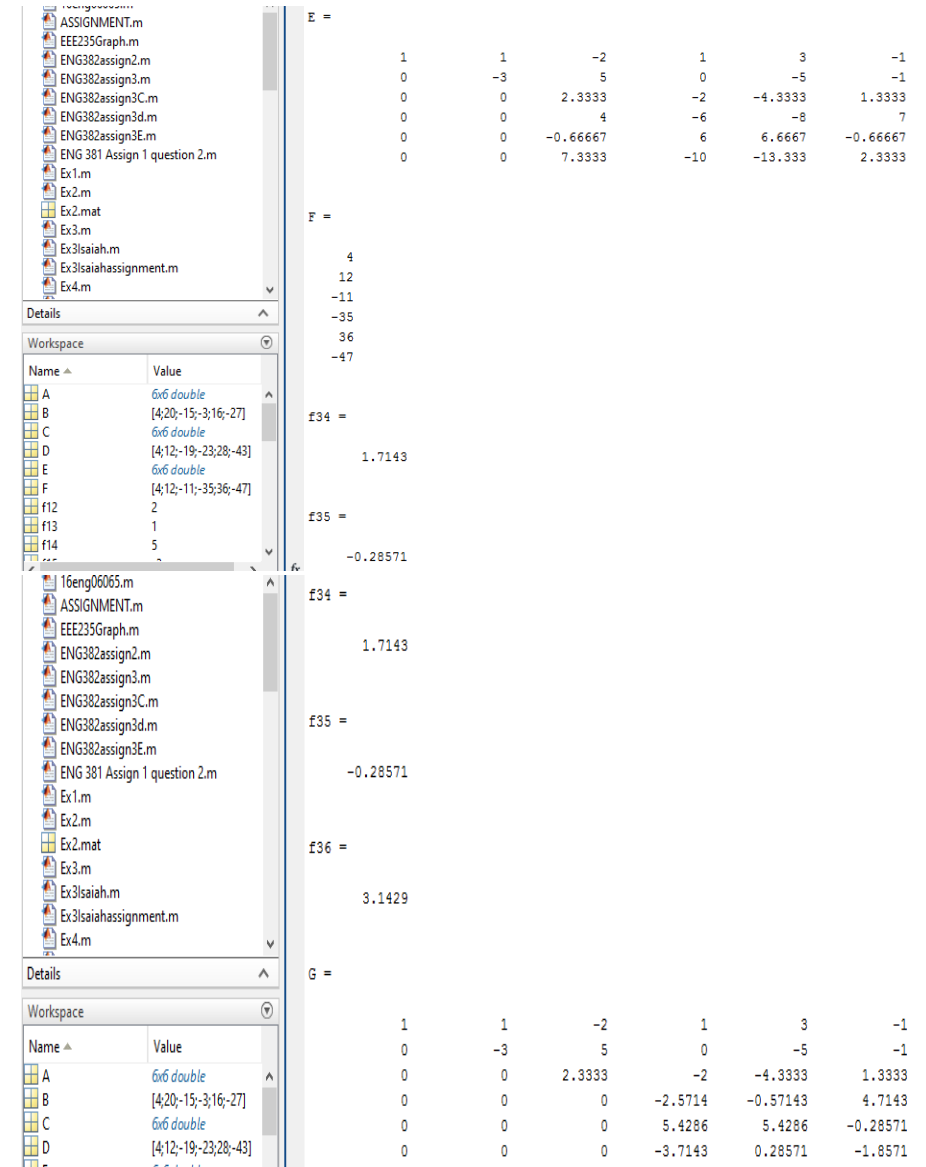
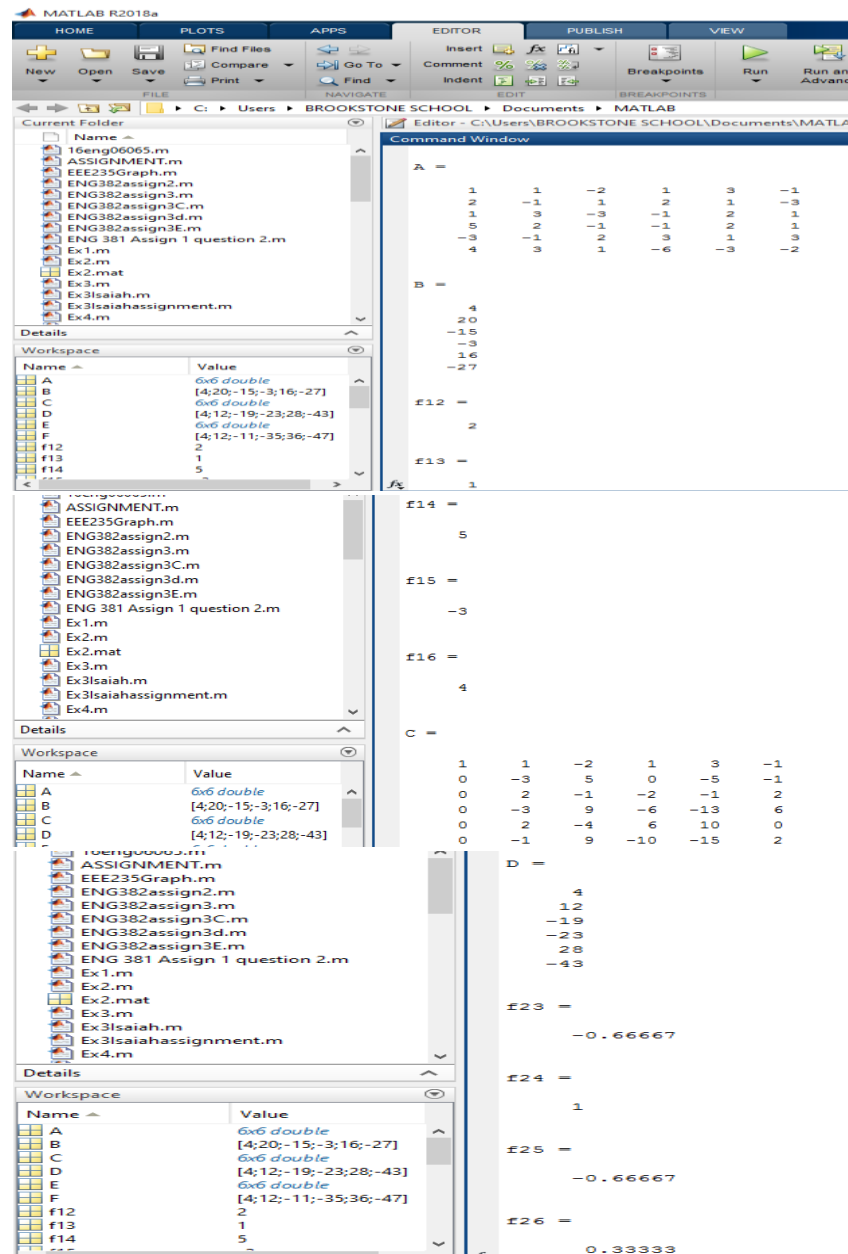
Details
Workspace
Name Value

75 - f34 = E(4,3)/E(3,3)
76 - f35 = E(5,3)/E(3,3)
77 - f36 = E(6,3)/E(3,3)
78
79 - G = [E(1,1), E(1,2), E(1,3), E(1,4), E(1,5) E(1,6)
80 E(2,1), E(2,2), E(2,3), E(2,4), E(2,5) E(2,6)
81 E(3,1), E(3,2), E(3,3), E(3,4), E(3,5), E(3,6)
82 E(4,1), E(4,2), E(4,3)-f34*E(3,3), E(4,4)-f34*E(3,4), E(4,5)-f34*E(3,5), E(4,6)-f34*E(3,6)
83 E(5,1), E(5,2), E(5,3)-f35*E(3,3), E(5,4)-f35*E(3,4), E(5,5)-f35*E(3,5), E(5,6)-f35*E(3,6)
84 E(6,1), E(6,2), E(6,3)-f36*E(3,3), E(6,4)-f36*E(3,4), E(6,5)-f36*E(3,5), E(6,6)-f36*E(3,6)
85 ]
86
87 - H = [F(1,1)
88 F(2,1)
89 F(3,1)
90 F(4,1)-f34*F(3,1)
91 F(5,1)-f35*F(3,1)
92 F(6,1)-f36*F(3,1)]
93
94
95 - f45 = G(5,4)/G(4,4)
96 - f46 = G(6,4)/G(4,4)

97 - I = [G(1,1), G(1,2), G(1,3), G(1,4), G(1,5) G(1,6)
98 G(2,1), G(2,2), G(2,3), G(2,4), G(2,5) G(2,6)
99 G(3,1), G(3,2), G(3,3), G(3,4), G(3,5), G(3,6)
100 G(4,1), G(4,2), G(4,3), G(4,4), G(4,5), G(4,6)
101 G(5,1), G(5,2), G(5,3), G(5,4)-f45*G(4,4), G(5,5)-f45*G(4,5), G(5,6)-f45*G(4,6)
102 G(6,1), G(6,2), G(6,3), G(6,4)-f46*G(4,4), G(6,5)-f46*G(4,5), G(6,6)-f46*G(4,6)
103 ]
104
105 - J = [H(1,1)
106 H(2,1)
107 H(3,1)
108 H(4,1)
109 H(5,1)-f45*H(4,1)
110 H(6,1)-f46*H(4,1)]
111
112
113 - f56 = I(6,5)/I(5,5)
114 - K = [I(1,1), I(1,2), I(1,3), I(1,4), I(1,5) I(1,6)
115 I(2,1), I(2,2), I(2,3), I(2,4), I(2,5) I(2,6)
116 I(3,1), I(3,2), I(3,3), I(3,4), I(3,5), I(3,6)
117 I(4,1), I(4,2), I(4,3), I(4,4), I(4,5), I(4,6)
118 I(5,1), I(5,2), I(5,3), I(5,4), I(5,5), I(5,6)
119 I(6,1), I(6,2), I(6,3), I(6,4), I(6,5)-f56*I(5,5), I(6,6)-f56*I(5,6)
120 ]
121
122 - L = [J(1,1)
123 J(2,1)
124 J(3,1)
125 J(4,1)
126 J(5,1)
127 J(6,1)-f56*J(5,1)]
128
129 - T6 = L(6,1)/K(6,6)
130 - T5 = (L(5,1)-(K(5,6)*T6))/K(5,5)
131 - T4 = (L(4,1)-(K(4,5)*T5+ K(4,6)*T6))/K(4,4)
132 - T3 = (L(3,1)-(K(3,4)*T4+ K(3,5)*T5+ K(3,6)*T6))/K(3,3)
133 - T2 = (L(2,1)-(K(2,3)*T3+ K(2,4)*T4+ K(2,5)*T5+ K(2,6)*T6))/K(2,2)
134 - T1 = (L(1,1)-(K(1,2)*T2+ K(1,3)*T3+ K(1,4)*T4+ K(1,5)*T5+ K(1,6)*T6))/K(1,1)
135
136 - T = [ T1; T2; T3; T4; T5; T6]

```

FIGURE C1: CODE FOR THE SOLUTION OF THE SET OF EQUATIONS



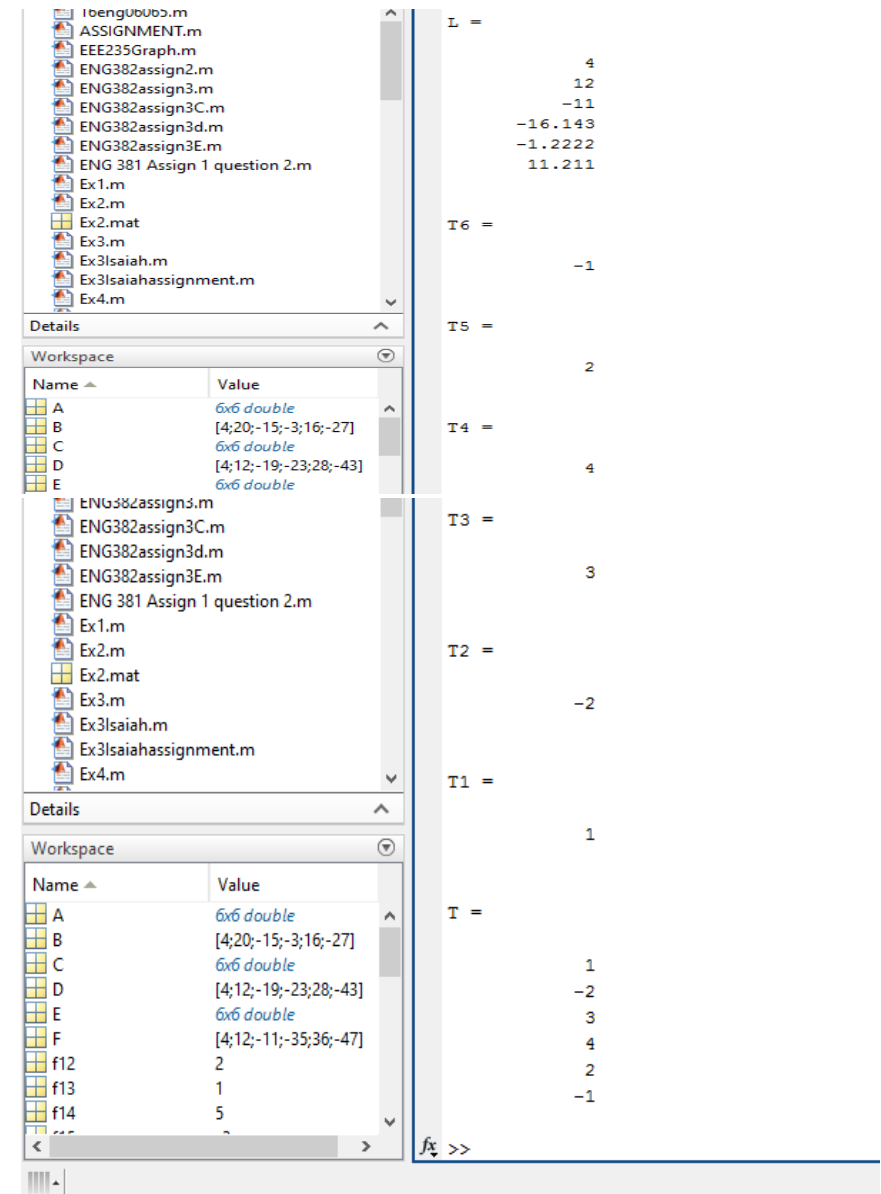
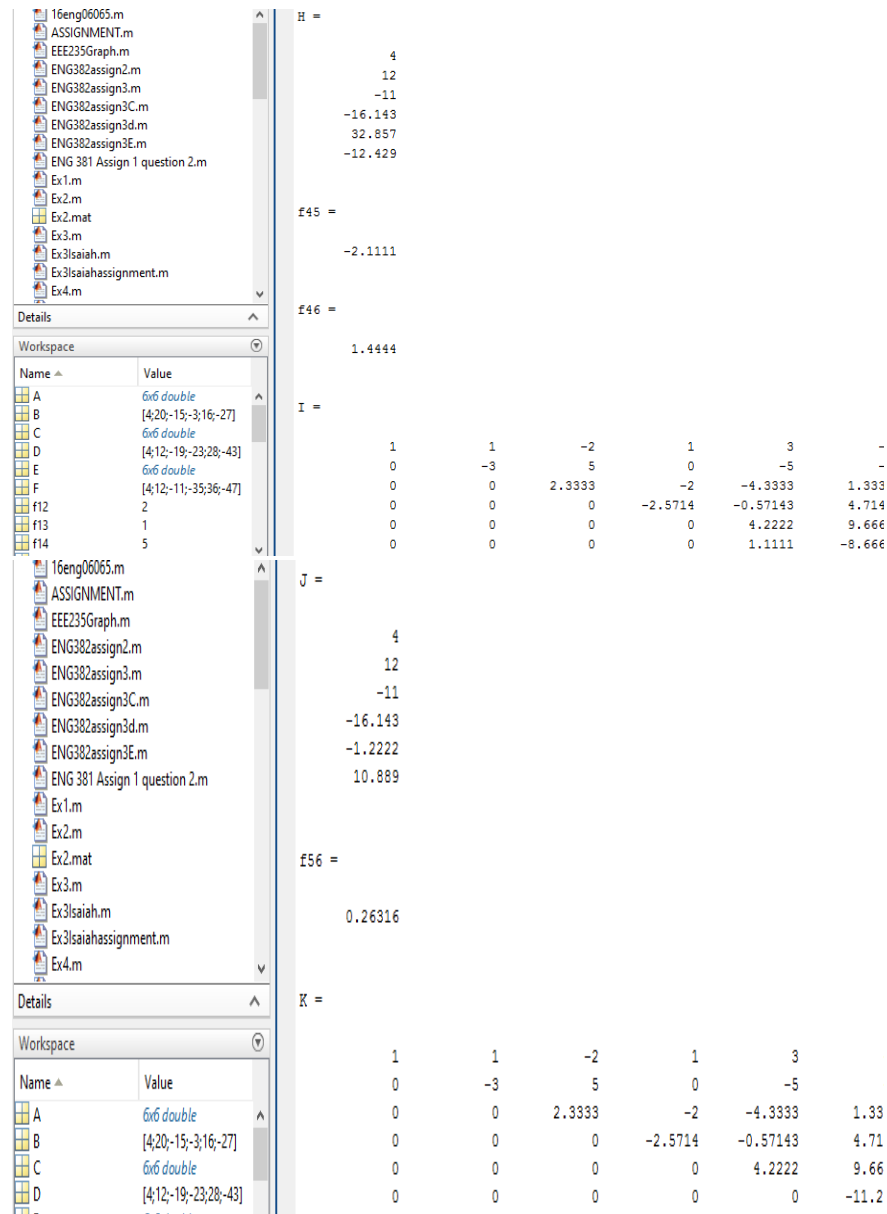


FIGURE C2: RESULTS FOR THE CODE

E. Solution using the matrix inverse method with the aid of MATLAB.

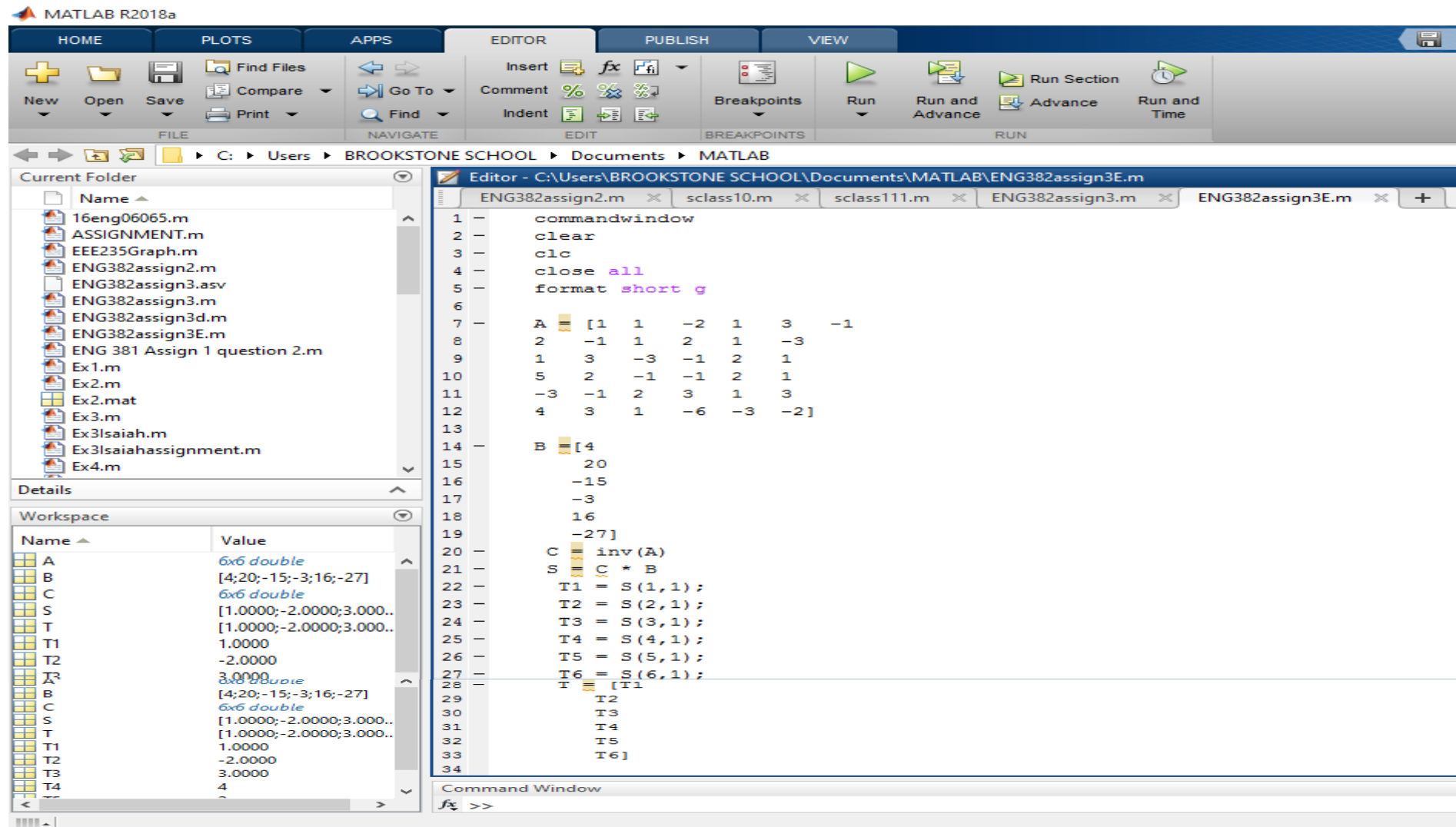


FIGURE E1: CODE FOR THE INVERSE MATRIX SOLUTION

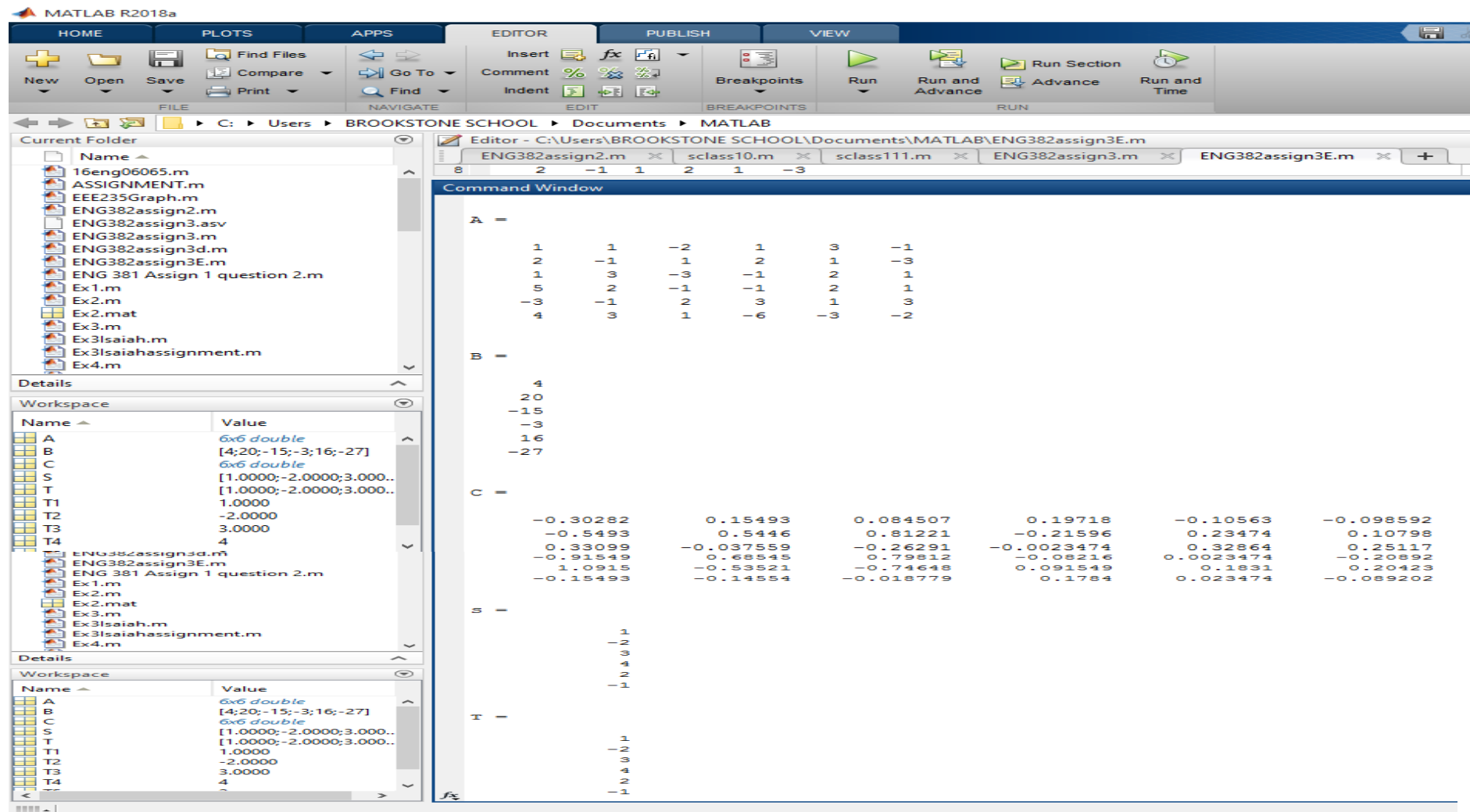


FIGURE E2: RESULTS OF THE CODE