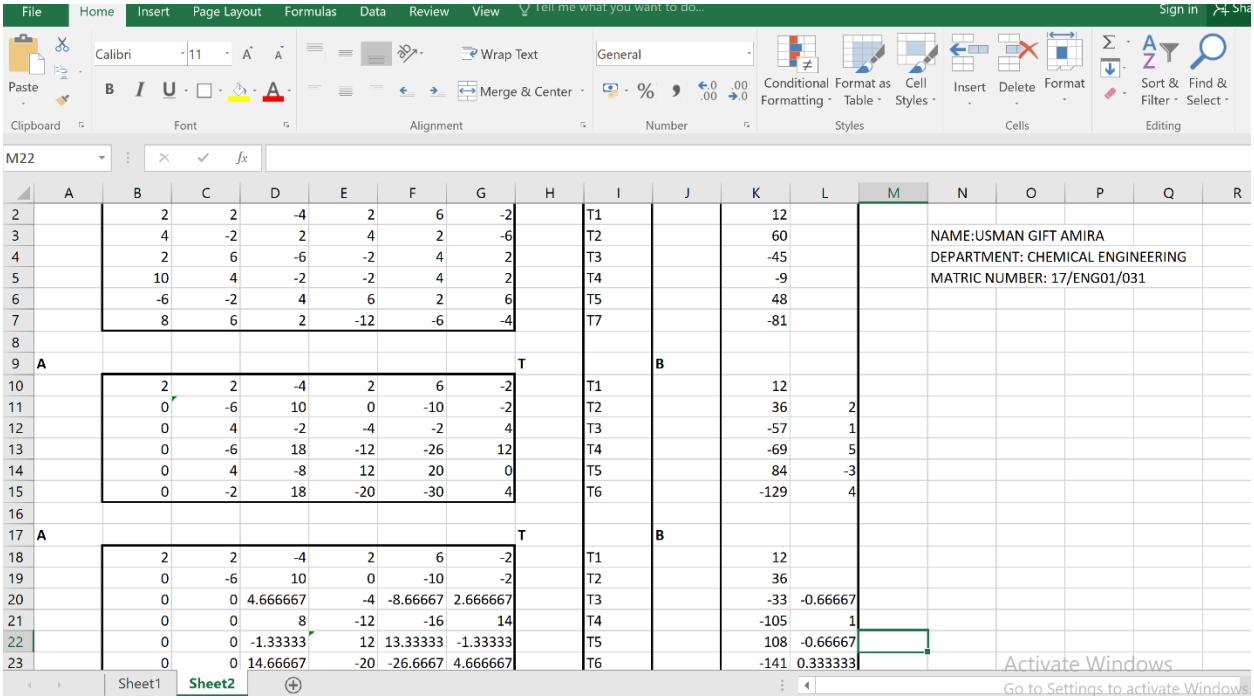
NAME: USMAN GIFT AMIRA

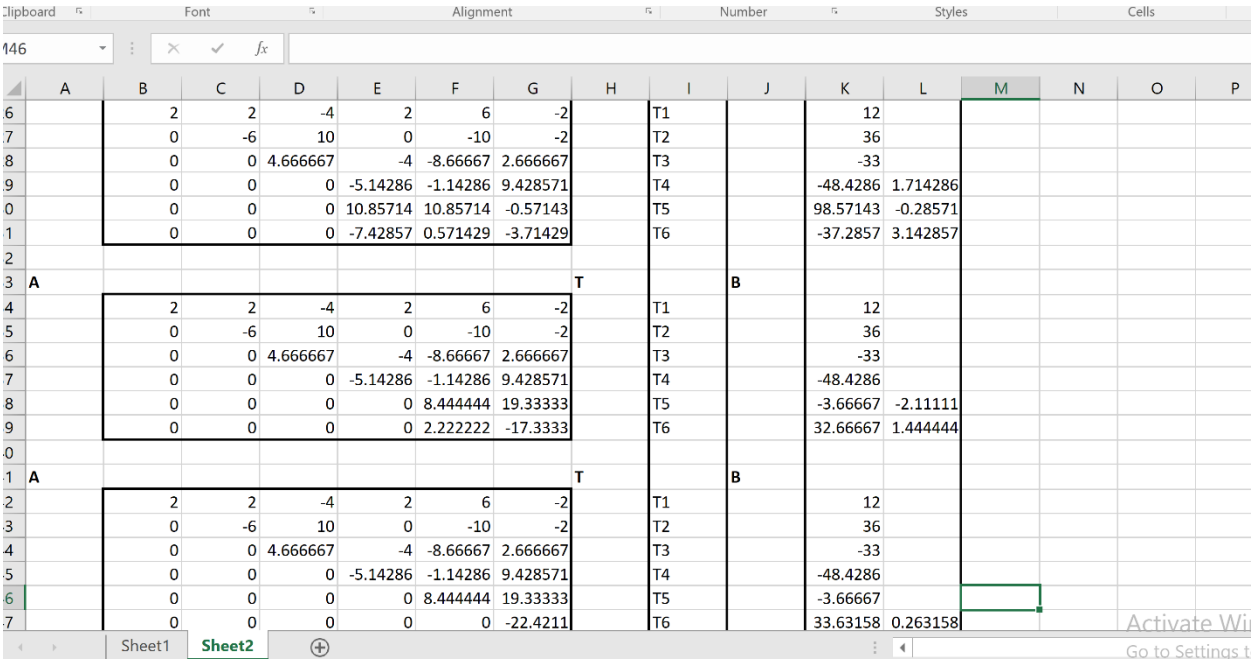
DEPARTMENT: CHEMICAL ENGINEERING

MATRIC NUMBER: 17/ENG01/031

A) GUASS ELIMINATION METHOD WITH MICROSOFT EXCEL



2		2	2	-4	2	6	-2		T1		12						
3		4	-2	2	4	2	-6		T2		60		NAME:USMAN GIFT AMIRA				
4		2	6	-6	-2	4	2		T3		-45		DEPARTMENT: CHEMICAL ENGINEERING				
5		10	4	-2	-2	4	2		T4		-9		MATRIC NUMBER: 17/ENG01/031				
6		-6	-2	4	6	2	6		T5		48						
7		8	6	2	-12	-6	-4		T7		-81						
8																	
9	A							T		B							
10		2	2	-4	2	6	-2		T1		12						
11		0	-6	10	0	-10	-2		T2		36	2					
12		0	4	-2	-4	-2	4		T3		-57	1					
13		0	-6	18	-12	-26	12		T4		-69	5					
14		0	4	-8	12	20	0		T5		84	-3					
15		0	-2	18	-20	-30	4		T6		-129	4					
16																	
17	A							T		B							
18		2	2	-4	2	6	-2		T1		12						
19		0	-6	10	0	-10	-2		T2		36						
20		0	0	4.666667	-4	-8.66667	2.666667		T3		-33	-0.66667					
21		0	0	8	-12	-16	14		T4		-105	1					
22		0	0	-1.33333	12	13.33333	-1.33333		T5		108	-0.66667					
23		0	0	14.66667	-20	-26.6667	4.666667		T6		-141	0.333333					



6		2	2	-4	2	6	-2		T1		12					
7		0	-6	10	0	-10	-2		T2		36					
8		0	0	4.666667	-4	-8.66667	2.666667		T3		-33					
9		0	0	0	-5.14286	-1.14286	9.428571		T4		-48.4286	1.714286				
10		0	0	0	10.85714	10.85714	-0.57143		T5		98.57143	-0.28571				
11		0	0	0	-7.42857	0.571429	-3.71429		T6		-37.2857	3.142857				
12																
13	A							T		B						
14		2	2	-4	2	6	-2		T1		12					
15		0	-6	10	0	-10	-2		T2		36					
16		0	0	4.666667	-4	-8.66667	2.666667		T3		-33					
17		0	0	0	-5.14286	-1.14286	9.428571		T4		-48.4286					
18		0	0	0	0	8.444444	19.33333		T5		-3.66667	-2.11111				
19		0	0	0	0	2.222222	-17.3333		T6		32.66667	1.444444				
20																
21	A							T		B						
22		2	2	-4	2	6	-2		T1		12					
23		0	-6	10	0	-10	-2		T2		36					
24		0	0	4.666667	-4	-8.66667	2.666667		T3		-33					
25		0	0	0	-5.14286	-1.14286	9.428571		T4		-48.4286					
26		0	0	0	0	8.444444	19.33333		T5		-3.66667					
27		0	0	0	0	0	-22.4211		T6		33.63158	0.263158				

B) GAUSS ELIMINATION METHOD WITH THE AID OF MATHCAD

$$:= \begin{bmatrix} a_{1,0} - \left(\frac{a_{1,0}}{a_{0,0}}\right)\cdot(a_{0,0}) & a_{1,1} - \left(\frac{a_{1,0}}{a_{0,0}}\right)\cdot(a_{0,1}) & a_{1,2} - \left(\frac{a_{1,0}}{a_{0,0}}\right)\cdot(a_{0,2}) & a_{1,3} - \left(\frac{a_{1,0}}{a_{0,0}}\right)\cdot(a_{0,3}) & a_{1,4} - \left(\frac{a_{1,0}}{a_{0,0}}\right)\cdot(a_{0,4}) & a_{1,5} - \left(\frac{a_{1,0}}{a_{0,0}}\right)\cdot(a_{0,5}) \\ a_{2,0} - \left(\frac{a_{2,0}}{a_{0,0}}\right)\cdot(a_{0,0}) & a_{2,1} - \left(\frac{a_{2,0}}{a_{0,0}}\right)\cdot(a_{0,1}) & a_{2,2} - \left(\frac{a_{2,0}}{a_{0,0}}\right)\cdot(a_{0,2}) & a_{2,3} - \left(\frac{a_{2,0}}{a_{0,0}}\right)\cdot(a_{0,3}) & a_{2,4} - \left(\frac{a_{2,0}}{a_{0,0}}\right)\cdot(a_{0,4}) & a_{2,5} - \left(\frac{a_{2,0}}{a_{0,0}}\right)\cdot(a_{0,5}) \\ a_{3,0} - \left(\frac{a_{3,0}}{a_{0,0}}\right)\cdot(a_{0,0}) & a_{3,1} - \left(\frac{a_{3,0}}{a_{0,0}}\right)\cdot(a_{0,1}) & a_{3,2} - \left(\frac{a_{3,0}}{a_{0,0}}\right)\cdot(a_{0,2}) & a_{3,3} - \left(\frac{a_{3,0}}{a_{0,0}}\right)\cdot(a_{0,3}) & a_{3,4} - \left(\frac{a_{3,0}}{a_{0,0}}\right)\cdot(a_{0,4}) & a_{3,5} - \left(\frac{a_{3,0}}{a_{0,0}}\right)\cdot(a_{0,5}) \\ a_{4,0} - \left(\frac{a_{4,0}}{a_{0,0}}\right)\cdot(a_{0,0}) & a_{4,1} - \left(\frac{a_{4,0}}{a_{0,0}}\right)\cdot(a_{0,1}) & a_{4,2} - \left(\frac{a_{4,0}}{a_{0,0}}\right)\cdot(a_{0,2}) & a_{4,3} - \left(\frac{a_{4,0}}{a_{0,0}}\right)\cdot(a_{0,3}) & a_{4,4} - \left(\frac{a_{4,0}}{a_{0,0}}\right)\cdot(a_{0,4}) & a_{4,5} - \left(\frac{a_{4,0}}{a_{0,0}}\right)\cdot(a_{0,5}) \\ a_{5,0} - \left(\frac{a_{5,0}}{a_{0,0}}\right)\cdot(a_{0,0}) & a_{5,1} - \left(\frac{a_{5,0}}{a_{0,0}}\right)\cdot(a_{0,1}) & a_{5,2} - \left(\frac{a_{5,0}}{a_{0,0}}\right)\cdot(a_{0,2}) & a_{5,3} - \left(\frac{a_{5,0}}{a_{0,0}}\right)\cdot(a_{0,3}) & a_{5,4} - \left(\frac{a_{5,0}}{a_{0,0}}\right)\cdot(a_{0,4}) & a_{5,5} - \left(\frac{a_{5,0}}{a_{0,0}}\right)\cdot(a_{0,5}) \end{bmatrix} = \begin{pmatrix} 2 & 2 & -4 & 2 & 6 & -2 \\ 0 & -6 & 10 & 0 & -10 & -2 \\ 0 & 4 & -2 & -4 & -2 & 4 \\ 0 & -6 & 18 & -12 & -26 & 12 \\ 0 & 4 & -8 & 12 & 20 & 0 \\ 0 & -2 & 18 & -20 & -30 & 4 \end{pmatrix}$$

$$b1 := \begin{bmatrix} b_0 \\ b_1 - \left(\frac{a_{1,0}}{a_{0,0}}\right)\cdot b_0 \\ b_2 - \left(\frac{a_{2,0}}{a_{0,0}}\right)\cdot b_0 \\ b_3 - \left(\frac{a_{3,0}}{a_{0,0}}\right)\cdot b_0 \\ b_4 - \left(\frac{a_{4,0}}{a_{0,0}}\right)\cdot b_0 \end{bmatrix} = \begin{pmatrix} 12 \\ 36 \\ -57 \\ -69 \\ 84 \\ -129 \end{pmatrix}$$

$$\begin{pmatrix} b_4 - \left(\frac{a_{4,0}}{a_{0,0}}\right)\cdot b_0 \\ b_5 - \left(\frac{a_{5,0}}{a_{0,0}}\right)\cdot b_0 \end{pmatrix} \quad \begin{pmatrix} -129 \end{pmatrix}$$

$$a2 := \begin{bmatrix} 2 & 2 & -4 & 2 & 6 & -2 \\ a1_{1,0} & a1_{1,1} & a1_{1,2} & a1_{1,3} & a1_{1,4} & a1_{1,5} \\ a1_{2,0} - \left(\frac{a1_{2,1}}{a1_{1,1}}\right)\cdot(a1_{1,0}) & a1_{2,1} - \left(\frac{a1_{2,1}}{a1_{1,1}}\right)\cdot(a1_{1,1}) & a1_{2,2} - \left(\frac{a1_{2,1}}{a1_{1,1}}\right)\cdot(a1_{1,2}) & a1_{2,3} - \left(\frac{a1_{2,1}}{a1_{1,1}}\right)\cdot(a1_{1,3}) & a1_{2,4} - \left(\frac{a1_{2,1}}{a1_{1,1}}\right)\cdot(a1_{1,4}) & a1_{2,5} - \left(\frac{a1_{2,1}}{a1_{1,1}}\right)\cdot(a1_{1,5}) \\ a1_{3,0} - \left(\frac{a1_{3,1}}{a1_{1,1}}\right)\cdot(a1_{1,0}) & a1_{3,1} - \left(\frac{a1_{3,1}}{a1_{1,1}}\right)\cdot(a1_{1,1}) & a1_{3,2} - \left(\frac{a1_{3,1}}{a1_{1,1}}\right)\cdot(a1_{1,2}) & a1_{3,3} - \left(\frac{a1_{3,1}}{a1_{1,1}}\right)\cdot(a1_{1,3}) & a1_{3,4} - \left(\frac{a1_{3,1}}{a1_{1,1}}\right)\cdot(a1_{1,4}) & a1_{3,5} - \left(\frac{a1_{3,1}}{a1_{1,1}}\right)\cdot(a1_{1,5}) \\ a1_{4,0} - \left(\frac{a1_{4,1}}{a1_{1,1}}\right)\cdot(a1_{1,0}) & a1_{4,1} - \left(\frac{a1_{4,1}}{a1_{1,1}}\right)\cdot(a1_{1,1}) & a1_{4,2} - \left(\frac{a1_{4,1}}{a1_{1,1}}\right)\cdot(a1_{1,2}) & a1_{4,3} - \left(\frac{a1_{4,1}}{a1_{1,1}}\right)\cdot(a1_{1,3}) & a1_{4,4} - \left(\frac{a1_{4,1}}{a1_{1,1}}\right)\cdot(a1_{1,4}) & a1_{4,5} - \left(\frac{a1_{4,1}}{a1_{1,1}}\right)\cdot(a1_{1,5}) \\ a1_{5,0} - \left(\frac{a1_{5,1}}{a1_{1,1}}\right)\cdot(a1_{1,0}) & a1_{5,1} - \left(\frac{a1_{5,1}}{a1_{1,1}}\right)\cdot(a1_{1,1}) & a1_{5,2} - \left(\frac{a1_{5,1}}{a1_{1,1}}\right)\cdot(a1_{1,2}) & a1_{5,3} - \left(\frac{a1_{5,1}}{a1_{1,1}}\right)\cdot(a1_{1,3}) & a1_{5,4} - \left(\frac{a1_{5,1}}{a1_{1,1}}\right)\cdot(a1_{1,4}) & a1_{5,5} - \left(\frac{a1_{5,1}}{a1_{1,1}}\right)\cdot(a1_{1,5}) \end{bmatrix} = \begin{pmatrix} 2 & 2 & -4 & 2 & 6 & -2 \\ 0 & -6 & 10 & 0 & -10 & -2 \\ 0 & 0 & 4.667 & -4 & -8.667 & 2.667 \\ 0 & 0 & 8 & -12 & -16 & 14 \\ 0 & 0 & -1.333 & 12 & 13.333 & -1.333 \\ 0 & 0 & 14.667 & -20 & -26.667 & 4.667 \end{pmatrix}$$

$$b2 := \begin{bmatrix} b1_0 \\ b1_1 \\ b1_2 - \left(\frac{a1_{2,1}}{a1_{1,1}}\right)\cdot b1_1 \\ b1_3 - \left(\frac{a1_{3,1}}{a1_{1,1}}\right)\cdot b1_1 \\ b1_4 - \left(\frac{a1_{4,1}}{a1_{1,1}}\right)\cdot b1_1 \\ b1_5 - \left(\frac{a1_{5,1}}{a1_{1,1}}\right)\cdot b1_1 \end{bmatrix} = \begin{pmatrix} 12 \\ 36 \\ -33 \\ -105 \\ 108 \\ -141 \end{pmatrix}$$

$$a3 := \begin{bmatrix} 2 & 2 & -4 & 2 & 6 & -2 \\ a2_{1,0} & a2_{1,1} & a2_{1,2} & a2_{1,3} & a2_{1,4} & a2_{1,5} \\ a2_{2,0} & a2_{2,1} & a2_{2,2} & a2_{2,3} & a2_{2,4} & a2_{2,5} \\ a2_{3,0} - \left(\frac{a2_{3,2}}{a2_{2,2}}\right)\cdot(a2_{2,0}) & a2_{3,1} - \left(\frac{a2_{3,2}}{a2_{2,2}}\right)\cdot(a2_{2,1}) & a2_{3,2} - \left(\frac{a2_{3,2}}{a2_{2,2}}\right)\cdot(a2_{2,2}) & a2_{3,3} - \left(\frac{a2_{3,2}}{a2_{2,2}}\right)\cdot(a2_{2,3}) & a2_{3,4} - \left(\frac{a2_{3,2}}{a2_{2,2}}\right)\cdot(a2_{2,4}) & a2_{3,5} - \left(\frac{a2_{3,2}}{a2_{2,2}}\right)\cdot(a2_{2,5}) \\ a2_{4,0} - \left(\frac{a2_{4,2}}{a2_{2,2}}\right)\cdot(a2_{2,0}) & a2_{4,1} - \left(\frac{a2_{4,2}}{a2_{2,2}}\right)\cdot(a2_{2,1}) & a2_{4,2} - \left(\frac{a2_{4,2}}{a2_{2,2}}\right)\cdot(a2_{2,2}) & a2_{4,3} - \left(\frac{a2_{4,2}}{a2_{2,2}}\right)\cdot(a2_{2,3}) & a2_{4,4} - \left(\frac{a2_{4,2}}{a2_{2,2}}\right)\cdot(a2_{2,4}) & a2_{4,5} - \left(\frac{a2_{4,2}}{a2_{2,2}}\right)\cdot(a2_{2,5}) \\ a2_{5,0} - \left(\frac{a2_{5,2}}{a2_{2,2}}\right)\cdot(a2_{2,0}) & a2_{5,1} - \left(\frac{a2_{5,2}}{a2_{2,2}}\right)\cdot(a2_{2,1}) & a2_{5,2} - \left(\frac{a2_{5,2}}{a2_{2,2}}\right)\cdot(a2_{2,2}) & a2_{5,3} - \left(\frac{a2_{5,2}}{a2_{2,2}}\right)\cdot(a2_{2,3}) & a2_{5,4} - \left(\frac{a2_{5,2}}{a2_{2,2}}\right)\cdot(a2_{2,4}) & a2_{5,5} - \left(\frac{a2_{5,2}}{a2_{2,2}}\right)\cdot(a2_{2,5}) \end{bmatrix} = \begin{pmatrix} 2 & 2 & -4 & 2 & 6 & -2 \\ 0 & -6 & 10 & 0 & -10 & -2 \\ 0 & 0 & 4.667 & -4 & -8.667 & 2.667 \\ 0 & 0 & 0 & -5.143 & -1.143 & 9.429 \\ 0 & 0 & 0 & 10.857 & 10.857 & -0.571 \\ 0 & 0 & 0 & -7.429 & 0.571 & -3.714 \end{pmatrix}$$

$$b3 := \begin{bmatrix} b2_0 \\ b2_1 \\ b2_2 \\ b2_3 - \left(\frac{a2_{3,2}}{a2_{2,2}}\right)\cdot b2_2 \\ b2_4 - \left(\frac{a2_{4,2}}{a2_{2,2}}\right)\cdot b2_2 \\ b2_5 - \left(\frac{a2_{5,2}}{a2_{2,2}}\right)\cdot b2_2 \end{bmatrix} = \begin{pmatrix} 12 \\ 36 \\ -33 \\ -48.429 \\ 98.571 \\ -37.286 \end{pmatrix}$$

$$a4 := \begin{bmatrix} 2 & 2 & -4 & 2 & 6 & -2 \\ a3_{1,0} & a3_{1,1} & a3_{1,2} & a3_{1,3} & a3_{1,4} & a3_{1,5} \\ a3_{2,0} & a3_{2,1} & a3_{2,2} & a3_{2,3} & a3_{2,4} & a3_{2,5} \\ a3_{3,0} & a3_{3,1} & a3_{3,2} & a3_{3,3} & a3_{3,4} & a3_{3,5} \\ a3_{4,0} - \left(\frac{a3_{4,3}}{a3_{3,3}}\right)\cdot(a3_{3,0}) & a3_{4,1} - \left(\frac{a3_{4,3}}{a3_{3,3}}\right)\cdot(a3_{3,1}) & a3_{4,2} - \left(\frac{a3_{4,3}}{a3_{3,3}}\right)\cdot(a3_{3,2}) & a3_{4,3} - \left(\frac{a3_{4,3}}{a3_{3,3}}\right)\cdot(a3_{3,3}) & a3_{4,4} - \left(\frac{a3_{4,3}}{a3_{3,3}}\right)\cdot(a3_{3,4}) & a3_{4,5} - \left(\frac{a3_{4,3}}{a3_{3,3}}\right)\cdot(a3_{3,5}) \\ a3_{5,0} - \left(\frac{a3_{5,3}}{a3_{3,3}}\right)\cdot(a3_{3,0}) & a3_{5,1} - \left(\frac{a3_{5,3}}{a3_{3,3}}\right)\cdot(a3_{3,1}) & a3_{5,2} - \left(\frac{a3_{5,3}}{a3_{3,3}}\right)\cdot(a3_{3,2}) & a3_{5,3} - \left(\frac{a3_{5,3}}{a3_{3,3}}\right)\cdot(a3_{3,3}) & a3_{5,4} - \left(\frac{a3_{5,3}}{a3_{3,3}}\right)\cdot(a3_{3,4}) & a3_{5,5} - \left(\frac{a3_{5,3}}{a3_{3,3}}\right)\cdot(a3_{3,5}) \end{bmatrix} = \begin{pmatrix} 2 & 2 & -4 & 2 & 6 & -2 \\ 0 & -6 & 10 & 0 & -10 & -2 \\ 0 & 0 & 4.667 & -4 & -8.667 & 2.667 \\ 0 & 0 & 0 & -5.143 & -1.143 & 9.429 \\ 0 & 0 & 0 & 0 & 8.444 & 19.333 \\ 0 & 0 & 0 & 0 & 2.222 & -17.333 \end{pmatrix}$$

$$b4 := \begin{bmatrix} b3_0 \\ b3_1 \\ b3_2 \\ b3_3 \\ b3_4 - \left(\frac{a3_{4,3}}{a3_{3,3}}\right)\cdot b3_3 \\ b3_5 - \left(\frac{a3_{5,3}}{a3_{3,3}}\right)\cdot b3_3 \end{bmatrix} = \begin{pmatrix} 12 \\ 36 \\ -33 \\ -48.429 \\ -3.667 \\ 32.667 \end{pmatrix}$$

$$a5 := \begin{bmatrix} 2 & 2 & -4 & 2 & 6 & -2 \\ a4_{1,0} & a4_{1,1} & a4_{1,2} & a4_{1,3} & a4_{1,4} & a4_{1,5} \\ a4_{2,0} & a4_{2,1} & a4_{2,2} & a4_{2,3} & a4_{2,4} & a4_{2,5} \\ a4_{3,0} & a4_{3,1} & a4_{3,2} & a4_{3,3} & a4_{3,4} & a4_{3,5} \\ a4_{4,0} & a4_{4,1} & a4_{4,2} & a4_{4,3} & a4_{4,4} & a4_{4,5} \\ a4_{5,0} - \left(\frac{a4_{5,4}}{a4_{4,4}}\right)\cdot(a4_{4,0}) & a4_{5,1} - \left(\frac{a4_{5,4}}{a4_{4,4}}\right)\cdot(a4_{4,1}) & a4_{5,2} - \left(\frac{a4_{5,4}}{a4_{4,4}}\right)\cdot(a4_{4,2}) & a4_{5,3} - \left(\frac{a4_{5,4}}{a4_{4,4}}\right)\cdot(a4_{4,3}) & a4_{5,4} - \left(\frac{a4_{5,4}}{a4_{4,4}}\right)\cdot(a4_{4,4}) & a4_{5,5} - \left(\frac{a4_{5,4}}{a4_{4,4}}\right)\cdot(a4_{4,5}) \end{bmatrix} = \begin{pmatrix} 2 & 2 & -4 & 2 & 6 & -2 \\ 0 & -6 & 10 & 0 & -10 & -2 \\ 0 & 0 & 4.667 & -4 & -8.667 & 2.667 \\ 0 & 0 & 0 & -5.143 & -1.143 & 9.429 \\ 0 & 0 & 0 & 0 & 8.444 & 19.333 \\ 0 & 0 & 0 & 0 & 0 & -22.421 \end{pmatrix}$$

$$b5 := \begin{bmatrix} b4_0 \\ b4_1 \\ b4_2 \\ b4_3 \\ b4_4 \\ b4_5 - \left(\frac{a4_{5,4}}{a4_{4,4}}\right)\cdot b4_4 \end{bmatrix} = \begin{pmatrix} 12 \\ 36 \\ -33 \\ -48.429 \\ -3.667 \\ 33.632 \end{pmatrix}$$

$$T_5 := \frac{b5_5}{a5_{5,5}} = -1.5$$

$$T_4 := \frac{b5_4 - (a5_{4,5} \cdot T_5)}{a5_{4,4}} = 3$$

$$T_3 := \frac{b5_3 - (a5_{3,5} \cdot T_5) - (a5_{3,4} \cdot T_4)}{a5_{3,3}} = 6$$

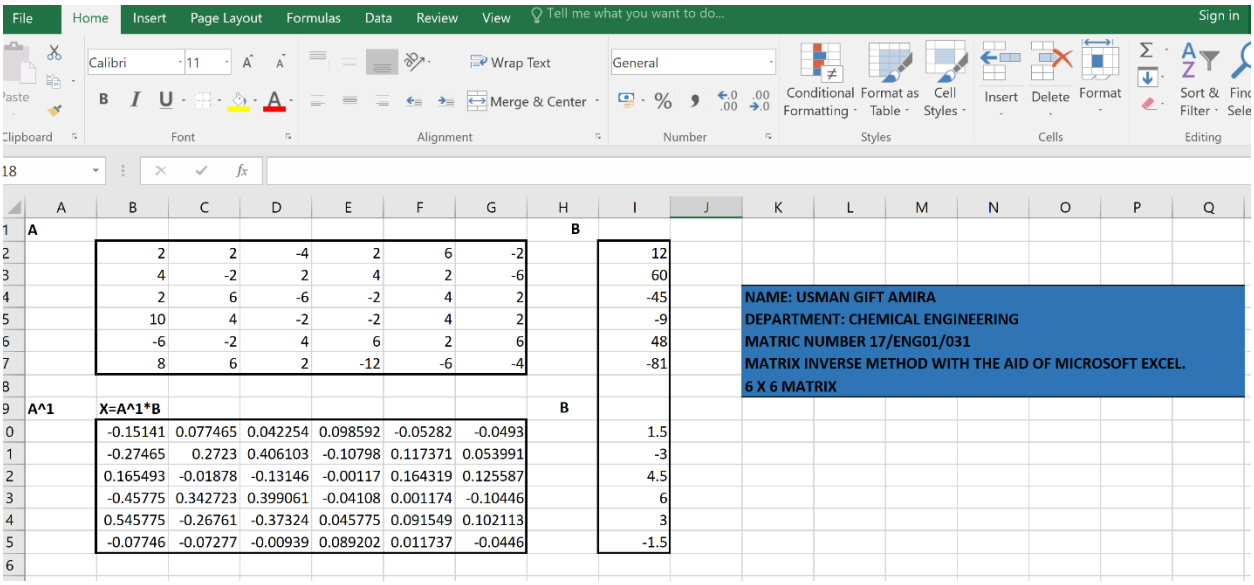
$$T_2 := \frac{b5_2 - (a5_{2,5} \cdot T_5) - (a5_{2,4} \cdot T_4) - (a5_{2,3} \cdot T_3)}{a5_{2,2}} = 4.5$$

$$T_1 := \frac{b5_1 - (a5_{1,5} \cdot T_5) - (a5_{1,4} \cdot T_4) - (a5_{1,3} \cdot T_3) - (a5_{1,2} \cdot T_2)}{a5_{1,1}} = -3$$

$$T_0 := \frac{b5_0 - (a5_{0,5} \cdot T_5) - (a5_{0,4} \cdot T_4) - (a5_{0,3} \cdot T_3) - (a5_{0,2} \cdot T_2) - (a5_{0,1} \cdot T_1)}{a5_{0,0}} = 1.5$$

$$T = \begin{pmatrix} 1.5 \\ -3 \\ 4.5 \\ 6 \\ 3 \\ -1.5 \end{pmatrix}$$

C) MATRIX INVERSE METHOD WITH THE AID OF MICROSOFT EXCEL



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1	**A**							**B**									
2		2	2	-4	2	6	-2		12								
3		4	-2	2	4	2	-6		60								
4		2	6	-6	-2	4	2		-45		**NAME: USMAN GIFT AMIRA**						
5		10	4	-2	-2	4	2		-9		**DEPARTMENT: CHEMICAL ENGINEERING**						
6		-6	-2	4	6	2	6		48		**MATRIC NUMBER 17/ENG01/031**						
7		8	6	2	-12	-6	-4		-81		**MATRIX INVERSE METHOD WITH THE AID OF MICROSOFT EXCEL.**						
8											**6 X 6 MATRIX**						
9	**A^1**	**X=A^1*B**						**B**									
0		-0.15141	0.077465	0.042254	0.098592	-0.05282	-0.0493		1.5								
1		-0.27465	0.2723	0.406103	-0.10798	0.117371	0.053991		-3								
2		0.165493	-0.01878	-0.13146	-0.00117	0.164319	0.125587		4.5								
3		-0.45775	0.342723	0.399061	-0.04108	0.001174	-0.10446		6								
4		0.545775	-0.26761	-0.37324	0.045775	0.091549	0.102113		3								
5		-0.07746	-0.07277	-0.00939	0.089202	0.011737	-0.0446		-1.5								
6																	

D)MATRIX INVERSE METHOD WITH THE AID OF MATHCAD