ASSIGNMENT 2

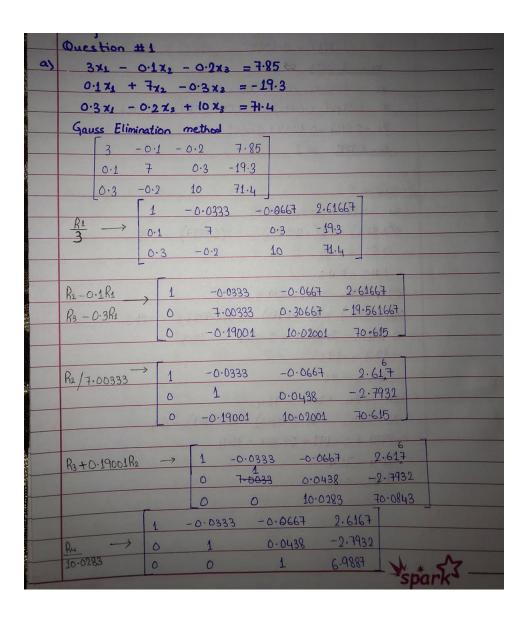
Name: Kulsoom Khurshid

Reg #: Sp20-BCS-044

Course: Numerical Computing

Question 1)

Part a)



```
\rightarrow \chi_3 = 6.9887 \not \sim 7
 \rightarrow \chi_2 + 0.0438 \chi_3 = -2.7932
    X2 + 0.0438 (6.9887) = -2.7932
                                It militano
    X2 = -2.7932 - 0.3061
   x2 = -3·0993 ≈ -3
\rightarrow \chi_1 - 0.0333 \chi_2 - 0.0667 \chi_3 = 2.6167
   X1 -0.0333 (-3.0993) -0.0667 (6.987) = 2.6167
   \chi_1 = 2.6167 - 0.1032 + 0.4661
   X1 = 2.9796 & 3
Verification 8-
→ 3x1 -0.1x2 -0.2x3 =7.85
  3(2.9796) - 0.1(-3.0993) - 0.2(6.9887) = 7.85
  7.85 = 7.85
 L.H.S = R.H.S
→ 0·1x1 +7x2 -0·3x3 = -19.3
  0.1(2.9796) + 7(-3.0993) - 0.3(6.9887) = -19.3
  0.29796 - 21.6951 + 2.0966 = -19.3
  -19.3 = -19.3
 L.H.S = R.H.S
\rightarrow 0.3x_1 - 0.2x_2 + 10x_3 = 71.4
 0.3(2.9796) -0.2(-3.0993) +10(6.9887) =71.4
 0.8939 + 0.6199 + 69.887 = 71.4
  71.4 = 71.4
  L.H.S = R.H.S
```

Part b)

Date											
6)	411	-2x2 -	3×3 +6	X4 = 12							
				-6x4 =	-6.5						
	$\chi_1 + 7.5\chi_2 + 6.25\chi_3 + 5.5\chi_4 = 16$										
	$-12\chi_{1} + 22\chi_{2} + 15.5\chi_{3} - \chi_{4} = 17$										
							-				- 1
				6		N					-
				; -6							-
-				5 5.5		4					
	1-12	22	15	-5 -1	17]						-
	0	0 .			7 -	0.05	- E E	10			
	Rearrange			1		6·25 6·5					
	(guap)					- 3					
			FARAGO			15.5					
	Cr.	11.73		12	22	100					
	R2 + 6R1		1	7.5	6.5	25 5.	5	16			
	R3-4R1		0	52	41	27	8	9.5			
	Ry + 12R1		0	-32	-2	3 -16	7	52	Y 613		
			0	112	90	5 65		209			
				-35¥5		9 914 90	31.15	1			
	$R_2 \longrightarrow$		7.5	6.2	5 5	5 16	694				
	52	0	1	0.84	62 0	•5192 1	-7212				
		0	-32	- 28	121746	-16	-52	Carrie as			
		0	112	90.	5	65	209				
	ac la		Cartain	inda.	(1-2-)-a	su (Inde		1445	10	Fig. 1	
				7.5	6.25	5.5		16			
-	R3 + 31 R2	-> 0		1	0.846		192	1.7212			
-	$R_4 - 112R_2$			0	D. Prince	216 0.					
F	4-112/12	0				744 6				1	
					4.2	144 6	0410	10 4	spar	ks -	

R ₃ ->	1	7.5	6.15	5.5	16	
-0.9216	0	1		0.5192		
	0	0	1			
	0	0	-4.2744	6.8496		
				*	-	
Ru+ 4.2744	$R_3 \longrightarrow$	1 7	.5 6.25	5.5	16	
		0 1	0.8462			
		1			-3.3403	
		0 0	0	3.9999	1.9478_	
Ru_ →	F					
3.9999	1		6.25			
	0	1	0.8462			
4.	0	0		0·6667 -		
2 % A 1	070	O	0	1 (3.4840	
$\rightarrow \chi_4 = 0.2$ $\rightarrow \chi_3 = -3.5$		בייני	2.1		9043	
×3 = -3.		324T		-6 N		
$\rightarrow \chi_2 = 1.721$		19 - 0.252	29			
×2 = 4.0			GLF C	Arthur		
→ xa = 16 -		+ 18.8475	5 - 2.6785			
X1 = 2.1		1 36	1000	C FILL	10 6 7 6 6	
Verification:	SLIF E	29/6 3	Call	1	Ole II	
	-2(4.02	01) -3(-3.0	156) +6(0.4	870) = 12		
	4(2.0182) - 2(4.0201) - 3(-3.0156) + 6(0.4870) = 12 $12.0 = 12$					
→ -6 (2·0182)	+7(4.0	201) +6.5(-	-3.0156)-6	(0-4870) =	-6.5	
	.5 = - (
→ 2.0182 +	7.5(4.02	201) + 6.25	(-3.0156)+	5.5(0.4870)) = 16 =>	
19/2 010	$2.0182 + 7.5(4.0201) + 6.25(-3.0156) + 5.5(0.4870) = 16 \implies 16 = 1$ $-12(2.0182) + 22(4.0201) + 15.5(-3.0156) - 0.4870 = 17$					

Question 2)

Part a)

e	1							
	Que	-			Gauss Jo			
)			100		-0.2			
					0.3	-		
		0.3	-		10		7	
	Q,					-0·0667		
	<u>R</u> 1 -	\rightarrow				0.3		
			0.3	<u> </u>	-0-2	10	11.4	
	R2-0.1	D.		ΓΛ	-0.0000	- 0.0667	F313.0	
	R3 - 0.3		-			0.3067		
1	13-03	DI.				10.0200		
1					0.7 100	10-0200	10 020	
t	R ₂			1	-0.0222	-0.0667	2.6167	110 100
ı	7.0033					0.0438		A TOTAL STATE OF THE PARTY OF T
İ				0		10.0200		
t					0 2 100	- 0 PA	e.P) = 1	
	R3+0-1	900R2	<i>→</i>	1	-0.0333	F330.0-	2.6167	are a la
I				0		0.0438		
				0	0		70.0843_	
						0.10		
	Ru)	1	-0.0333	F000-0-	2:6167	
-	10.02	33		0	1	0.0438	- 2.7932	
				0	0	1	- 2.7932 6.9887 70.0843	
-	31+0.	0333 F	2		1 0	-0.0652	2.5237	
1	11 . 0.1				0 1	0.0438	-2.7932	
					0 0	1	F88P.3	

Day Date				
	R1 + 0.0652R3	1 0 0	2.9794	gar salasada
	R2 -0.0438 R3	0 1 (-2.4871	
		0 0	1 6.9887	
		40.00		
	X1 = 2.9794	F200 0 - 10	22 TO BA	
	22 = - 2.4871	8-8	The state of the s	13
	X3 = 6.9887	at	9.0	601
	Verification:			
->	3(2.9794) -0.	1(-2.4871)	-0.2 (6.9887)) = 7·85
			.3977 = 7.85	Aux all
		= 7.85		
	7.8 =	7.8		
→	0.1 (2.9794) +:	A(-2.4871)	-0.3(6.9887)) = -19.3
			. 09661 = -19	
	- 19.258	3 = -19.3	MPI S	
	-19.3	= -19.3		
→	0.3 (2.9794) -0.	2 (-2.4871)	+10(6.9887)	= स.प
	0.89382 + 0.			
	71-4278 =		0	
	71.4 =			
	L.H.S =		38800000	
	Boll Garage	(810-0		
	And the best of	1	No. of the last of	
		F 25 % A		
	AND DESCRIPTION OF THE PARTY OF			

Part b)

yaie	
b) 4 -2	-3 6 12
-6 J	
1 7.5	5 6.25 5.5 16
-12 22	. 15.5 -1 17
	1 7.5 6.25 5.5
Swap Rs and F	$R_3 \rightarrow H^{-2} + R_3 + R_4 + R_5 + R$
	-6 7 6.5 -6 -6.5
	4 -2 -3 6 12
	12 22 15.5 -1 17
0 10	
R ₂ +6R ₁	1 7.5 6.25 5.5 16
R3 - 4R1	0 52 44 27 89.5 0 -32 -28 -16 -52
R4 + 12R1	0 -32 -28 -16 -52 0 112 90.5 65 209
	1112 10-5 65 251
R ₂	1 7.5 6.25 5.5 16
52	0 1 0.8462 0.5192 1.7212
	0 -32 -28 -16 -52
	0 112 90.5 65 209
P.F.	Torres a) 2 1 (220 0) 6 - (00000) 0 - (00000) 4 1 1 4
R1 - 7.5R2	1 0 -0.0965 1.606 3.091
$R_3 + 32R_2 \longrightarrow$	0 1 0.8462 0.5192 1.7212
Ry - 112 R2	0 0 -0.9216 0.6144 3.0784
100000000000000000000000000000000000000	0 0 -4-2744 6.8496 16.2256
R3	1 0 -0.0965 1.606 3.091
-0-9216	0 1 0.8462 0.5192 1.7212
	0 0 1 -0.6667 -3.3403
42	0 0 -4.2744 6.8496 16.2256

Day 1 Date	e
	R1 +0.0965 R3 1 0 0 1.5417 2.7687
	$R_2 - 0.8462 R_3 \rightarrow 0.1 0.0834 4.5478$
	Ry + 4.2744 R3 0 0 1 -0.6667 -3.3403
	0 0 0 3.9999 1.9478
	Ru → 1 0 0 1.5417 2.7687
	3-9999 0 1 0 1.0834 4-5478
	0 0 1 -0.6667 -3.3403
	0 0 0 1 0.4870
	R1 - 1.5417R4 1 0 0 0 2.0179
	R2-1.0834 R4 -> 0 1 0 0 4.0202
	R3 + 0.6667R4 0 0 1 0 -3.0156
	0 0 0 1 0.4870
	X1 = 2.0179
	X2 = 4.0202
	$x_3 = -3.0156$
	x4 = 0.4870
	Verification:
L)	4(2.0179) - 2(4.0202) - 3(-3.0156) + 6(0.4870) = 12
	12 = 12
4	-6(2.0179) +7(4.0202) +6.5(-3.0156) -6(0.4870) =-6.5
	-6.5 = -6.5
1.	2.049 + 7.5 (4.0202) + 6.25 (-3.0156) + 5.5 (0.4870) = 16
4	
	16 = 16
L	-12(2.0179) + 22(4.0202) + 15.5(-3.0156) - 0.4870 = 17
	14 -14
	102 1 102 0 7 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
	was in dealer with the same

Question 3)

Part a)

_	
Da -	ate and the second seco
	Overstion #3 LV Crout's method
	2) Matrix form
	3 -0.1 -0.2 7.85
	$0.1 7 -0.3 \chi_2 = -19.3$
	0.3 -0.2 10 ×3 71.4
	[A] - [1] [N]
	$\begin{bmatrix} A \end{bmatrix} = \begin{bmatrix} L \end{bmatrix} \begin{bmatrix} U \end{bmatrix}$ $\begin{bmatrix} 3 & -0.1 & -0.2 \end{bmatrix} \begin{bmatrix} J_{11} & 0 & 0 \end{bmatrix} \begin{bmatrix} 1 & U_{12} & U_{13} \end{bmatrix}$
	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$
	0.3 -0.2 10 131 132 133 0 0 1
	3 -0.1 -0.2 las las U12 las U13
	$0.1 7 -0.3 = 121 121 \cup 12 + 122 121 \cup 13 + 122 \cup 23$
	0.3 -0.2 10 ls1 ls1 ls2 ls2 ls2 ls2 ls3
	l11 = 3 , l21 = 0-1 , l31 = 0-3
	111 U12 = -0.1 lis U13 = -0.2
	$\Rightarrow 0.12 = -0.1 0.13 = -0.2 $
3	$\Rightarrow U_{12} = -0.0333$ $\Rightarrow U_{13} = -0.0667$
	The Francisco All Control of the Con
	121U12 + 122 = 7
	$l_{23} = 7 - (0.1)(-0.0333) \qquad U_{23} = -0.3 - (0.1 \times (-0.0667))$
	⇒ 122 = 7.00333 7.00333
	→ U23 = 0.0419
	$l_{31}U_{12} + l_{32} = -0.2$ $l_{31}U_{13} + l_{23}U_{23} + l_{33} = 10$
	132 = -0.2 - (0.3 x (-0.0333)) => [133 = 10.028]
	$=$) $\sqrt{19001}$

Dag i Date				1				
	L =	3 0	· 12200 114	1	1.3	3	# ack	
		0·1 7·0033	0					
		0.3 -0.1900	1 10.028		*			
								A
	U =	1 -0.0333	-0.06	67	100			
		0 1		9		-		
		0 0	Ø1		- 7	ra	100	
	As, [1	$\int [x] = [x]$	and L	1]	LYJ=	[6]		
	A PART	1 0 0						
		3 0	0		91	-	7.85	
		0.1 7.00333	0		7/2			
		0.3 -0.19001	10.028		43		71.4	
	all lie	371 = 7.88 11 = 2.6167	0.19	F + 1	· 00334	= -	19.3	
. 19.7	digti	y1 = 2.6167	42	2 ~	2.793	52		
	0.39-0.190014+10.0284 = 71.4							
		y3 = 6.9889	* 49 9	1		1:4		
	[1	[4] = [x] [9-23	
		<u> </u>	-	٢	7			7
		1 -0.0333	-0.0667	100	X1 =		. 6167	10
		0 1	0.0419	_	1/2		2.7932	
	0	0 0	Ø1	L	73		6.9889	
	(130-0-1x2-0)-8-0- = 183 (8880-0-(1-1)- F - 10)							
	=> ×3 = 6.9889							
	x ₂ = -2.7932 -0.3061							
		N2 = -3.0993						
		X1 -0.0333X2	= 70000-	2.6	167	2 24		
		N1 = 2.6167 +0.						
	=	x1 = 2.9796						
		The Residence of the Local Division in the L			Mark Mark		THE PROPERTY.	1

Part b)

Date
b) Matrix form
9 [4 -2 -3 6] [XI] [12
-6 7 6.5 -6 12 -6.5
1 7.5 6.25 5.5 xs 16
-12 22 15.5 -1 Xq 17
[A] = [L][[0]]
Ty -2 -3 6 7 [lu 0 0 0 1 U12 U13 U14
-6 7 6.5 -6 l21 022 0 0 0 1 U23 U24
1 7.5 6.25 5.5 lat lat lat 0 0 0 1 Usu
-12 22 15.5 -1 lus lus lus luy 0001
4 -2 -3 6 111 111 U12 111 U13 111 U14
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$
[-12 22 15.5 -1] [lys lysUs2+ly2 lysUs2+lygU22+ly3 /41Us4+ly2U24+ly3U
P11 U12 = -2
U12 = -0.5 U13 = -0.75 U14 = 1.5
The state of the s
$ _{122} = 4 _{123} = 0.5 _{124} = 0.75 $
SEPONIC Y OPENIC SOLD THE STATE OF THE STATE
132 = 8 133 = 3 U34 = -0.6667
ly2 = 16 ly3 = -1.5 ly4 = 3.99995
Jenne 3

Day 1 Date	
	L= 4 0 0 0
	-6 4 0 0
	1 8 3 0
	-12 16 -1.5 3.99995
	[L][Y]=[b]
10000	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$
I seeli esu	1 8 3 0 93 16
Jan to	-12 16 -1.5 3.99995 34 17
1000	$\Rightarrow y = 3 \Rightarrow -18 + 4y = -6.5 \Rightarrow 3 + 23 + 3y = 16$ $y = 2.875 \qquad y = -3.3333$
	$\frac{01}{2} = 2.875 \qquad 4 = -3.3333$
	production and the second seco
a specific fall	-36 +46 + 4.99995 +3.999954 = 17
astlet apilot	Ju = 0.50002
Ungland demand	[v][x]=[Y]
	[0][x]-[1]
	1 -0.2 -0.42 1.2 X1 3
	$0 1 0.5 0.75 \lambda_2 = 2.875$
	0 0 1 -0.6667 73 -3.3333
	0 0 0 1] [14] [0.5000]
	$x_4 = 0.5000$ $x_3 = -2.9999$ $x_2 = 3.99995$
	Leading to the later of the lat
	X1 = 2.000S
	1200002 - mil 1 201 - 100 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
of the supplied to the state of	

Question 4)

Part a) Jacobi Iterative Method and error Approximation

Date									
	Question #4								
	Jacobi iterative method								
a)									
	3								
	$\chi_2 = -0.1\chi_1 + 0.$	312 -19.3	6.25						
	x3 = -0.8x1 +0.	222 + 71.4		1 1 2 2 2	0.0				
	10								
	Guess	χı	1/2	7.8					
	initial	0	0	0					
	1 (0,0,0)	2.616	-2.757	7-14	1				
	2 (2.616, -2.757,7.14)	3.000	-2.488	7.006					
	3 (3.000)-2.48877.006)	3.000	- 2.499	7.000					
	4 (3.000, -2.499, 7.000)		-2.5	7.000					
	5 (3.000, -2.5, 7.000)	3	- 2.5	7					
	$\chi_1 = 3$ $\chi_2 = -9$.S , X3=	7						
b)	F 1 . F			*1.5	21 60				
	Error = max 3 /x1	$(-\chi_1^*), \chi_2^{(s)} $	$-\chi_2^*$, $\chi_3^{(1)}$	$-\chi_3^{\uparrow}$					
		99796	2.49995		012				
	Error = max { 3-0	299999 , 1-9	2.5+0000001,	17-6.988	913				
	Error = max { 0.0204, 000000, 0.0111}								
			*	Papier a	71.77				
	Error = 0.0204								

Day 1 Date								
b)	71 = 2x2 + 3x3 - 6x4		r tottom	ar Wansel	Lateral Latera			
	X2 = 6x1 - 6.5x3 + 6	24 -6.5	11 8	3 (1) (4)				
	$\chi_3 = -\chi_1 - 7.5\chi_2 - 5.5\chi_4 + 16$ 6.25							
	$\chi_{4} = -12\chi_{1} + 22\chi_{2} +$	15·5x3 -1	7	3/11/2/3				
	Guess	DKI	1/2	123	X4			
	Initial (0,0,0,0)	0	0	0	0			
	1(0.0,0,0)	3 -	0.9285	2.560	- 17			
	2(3,-0.9285,2.560,-17)	29.95	-15.30	18-15	-33.74			
	3 (29.95,-15.30, 18.15,-33.7			1 1 1 1 1 1 1 1	-431.6			
	4(59.57,-21.03,48.81,431.			A STATE OF THE STA	-4844			
	5 0000			1	2 -9909			
	The equations don	ot conve	erge.	LEONNE NO	1 (405-8) 1			
		A PEX	J	1	2:18			
6)	Error Approximation			ole agina	nA The State of th			
	Ma-Cat.	2 2 400		0001	3.0156			
	Error = may 3/846.9.	2.0182	1-207.81	4.0201 - Radios	1755.72 +200			
	Error = mar { 846.9.	9-0-800	013	-21 1 400	4 1 3 3 3 3			
			J					
	Error = max (844.9,	- 211.800) 1 r R =	11.8 40	(pm 2 - Pn 6			
		2(1,00	170 .	149) - (101.200035)			
	Error = 844.9							
CARLES AND	and the second second second second	Dealth Carry	Total - Talk	March Street				

Part b) Gauss Seidal Method and error Approximation

Date									
ii	Gauss Seidal Method								
a)	$x_1 = 0.1x_2 + 0.2x_3 + 7.85$								
	3								
	$\chi_2 = -0.1\chi_1 + 0.3\chi_3 - 19.3$								
	7								
	$\chi_8 = -0.3\chi_1 + 0.2\chi_2 + 71.4$								
	10		1						
		Zi	1 1/2	X3					
	1 (0,0,0), (2.6167,0,0), (2.6167,-2.7945,0)	0	0	0					
			-2.7945	7.0056					
	2 (2.6167,-2.7945,7-0056)	2.9906	-2.4996	7.0003					
	3	3-0000	-2-49999						
	4		-2.5						
1	5	3	-2.5	<u>t</u>					
	$\chi_1 = 3 \qquad \qquad \chi_2 = -2.5 \qquad \chi_3 = 7$								
b)	Error = max { 13-2.9796 , 1-2.5+3.0993 , 17-6.9887 }								
	Error = max { 0.0204, 0.6197, 0.0118}								
	Error = 0.6197								
<i>b</i>)	$\chi_1 = \frac{2\chi_2 + 3\chi_3 - 6\chi_4 + 12}{4}$ $\chi_4 = -12\chi_1 + 22\chi_2 + 15.5\chi_3 - 17$								
	$\chi_2 = 6\chi_1 - 6.5\chi_3 + 6\chi_4 - 6.5$								
	$\chi_3 = -\chi_1 - 7.5\chi_2 - 5.5\chi_4 + 16$ 6.25								
			V	+ 27					

Guess	7/1	7/2	1/3	1 Xy
1	3	1.642	0.1096	-15.17
2	26.65	0.809	1.074	-126.3
3	197.66	59.23	11.00	-915-36
4	1413.9	416.1	82.53	-6550
5	10097	2962	596.6	1-46769
	The equations			
Error Approx	Cimation			
C		2.0182 129	769 - 4.000	11, 1596.6
Error = n	nax { 10097 - 5	2.0182 , 29	162 - 4·020	11, 1596.6
Error = n	nax { 10097 - 5	2.0182 , 20 769 - 0.4870	162 - 4.020	11, 1596.6
	nax { 10097 - 5	769 - 0.4870	013	
	nax { 10097 - 5	769 - 0.4870	013	
Error = ma	nax { 10097 - 5 -46	769 - 0.4870	013	
	nax { 10097 - 5 -46	769 - 0.4870	013	
Error = ma	nax { 10097 - 5 -46	769 - 0.4870	013	
Error = ma	nax { 10097 - 5 -46	769 - 0.4870	013	
Error = ma	nax { 10097 - 5 -46	769 - 0.4870	013	
Error = ma	nax { 10097 - 5 -46	769 - 0.4870	013	
Error = ma	nax { 10097 - 5 -46	769 - 0.4870	013	
Error = ma	nax { 10097 - 5 -46	769 - 0.4870	013	
Error = ma	nax { 10097 - 5 -46	769 - 0.4870	013	