

- Filling out Student-ID and Student-Name on exam header is mandatory.
- Do not remove or change any part of exam header or question paper.
- Write down your answers in given space or at the end of exam paper with proper title "Answer for Question#".
- Answers should be formatted correctly (font size, alignment and etc.)
- Handwritten text or image should be on A4 size page with clear visibility of contents.
- Only PDF format is accepted (Student are advised to install necessary software)
- In case of CHEATING, COPIED material or any unfair means would result in negative marking or ZERO.
- A mandatory recorded viva session will be conducted to ascertain the quality of answer scripts where deemed necessary.
- <u>Caution:</u> Duration to perform Final-Term Assessment is **03 hours only**. Extra 01 hour is given to cater all kinds of odds in submission of Answer-sheet. <u>Therefore</u>, if you failed to upload answer sheet on LMS (in PDF format) within **04 hours limit**, you would be considered as ABSENT/FAILED.
- Timing of the assessment is from 01:00 pm to 04:00 pm extended till 05:00 pm.

"I promise that all the answers provided in this assessment are provided solely by me. I haven't discussed anything related to this assessment with anyone else"

### Name: Ali Afzal

<b>QUESTION</b>	TOTAL MARKS	MARKS OBTAINED
QUESTION # 01	05 + 05 = 10	
QUESTION # 02	05 + 05 = 10	
QUESTION # 03	10	
QUESTION # 04	10	

QUESTION # 01 (a):
Find the interpolating polynomial for the following data by,
Divided Difference Formula

X	0	1	2	3
y	1	3	7	13

AU AU QIQ	201 (1	3961)			
3		y=3	N2227		323.
			y	Dzy	P3 J
1	3	4	)	1	0.
2	7	(c	)	1	
Y= 1+(n.	(u-n0), (u-n0) (u-n0) (u-n0) (u-n0)	J(no,ul) + ( -0)(u-1) x1 - -2-4 + 42 - -4 + 0 .	u-no)(u-n 12) y (no + (u-o)(u- -n (n-2)	1) y (uo, 1) (u-2)	, W1, 42) 1W3).
Y= N2 4	N+1.				

### **QUESTION # 01 (b):**

Using Lagrange's Formula, find the value of F(1.5) = ?

X	0	1	2	3
y	1	3	7	13

## **QUESTION # 02 (a):**

Apply the Gauss Jacobi method to solve

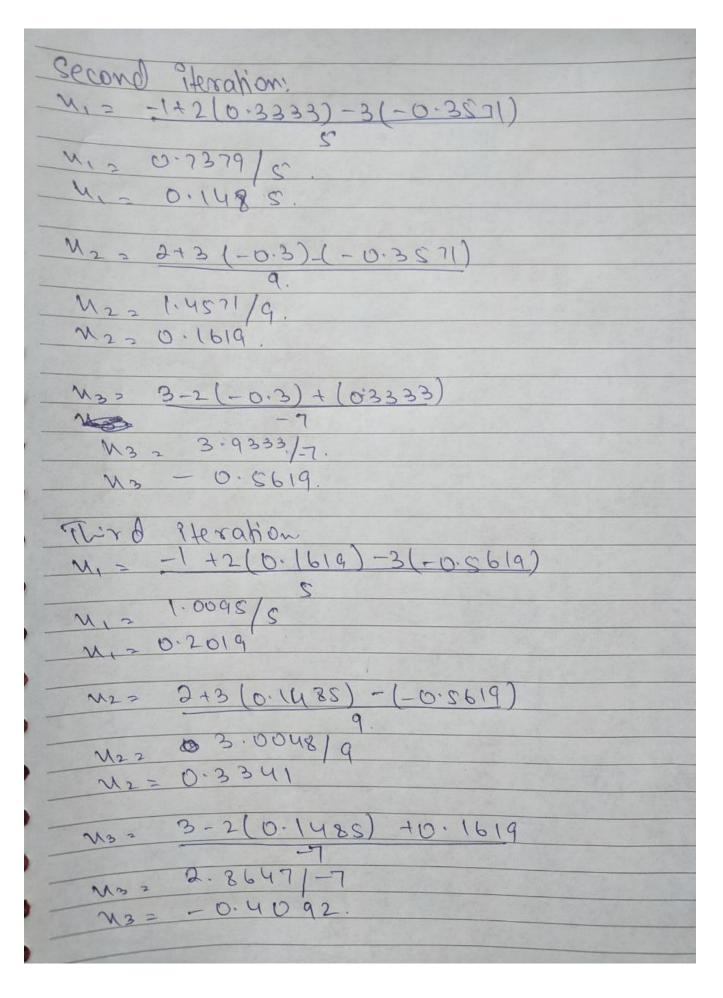
$$5x_1 - 2x_2 + 3x_3 = -1$$

$$-3x_1 + 9x_2 + x_3 = 2$$

$$2x_1 - x_2 - 7x_3 = 3$$

Choose the initial guess as (0.5,0.5,0.5).

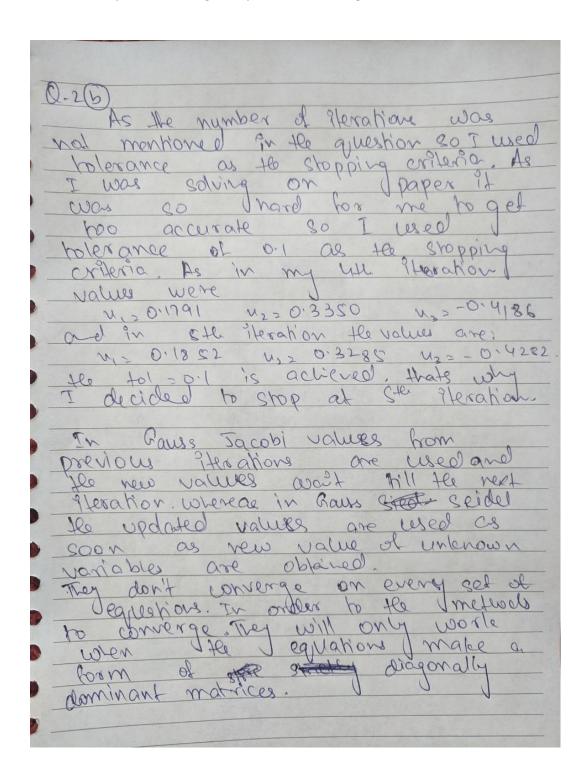
0-200
Q-2(a).  "Initial values:  """  """  """  """  """  """  """
N=0.5, Y=0.5, \$ Z=0.5
1 1303 / -
From &u, - 2u2 + 3u3 = -1
ue can derive;
Su, =-1 + 2u, + 3us.
$M_1 = -1+2u_2 - 3u_3$
S.
From -34, +942 + N3 = 2.
ue can derive.
$Qu_2 = 2 + 3u_1 - v_3.$
$\frac{M_2 = 2 + 3M_1 - M_3}{9}$
From 24, -42 - 743=3
we can derive,
$-7N_3 = 3 - 2N_1 + N_2$
$\frac{M_3 = 3 - 2N_1 + N_2}{-7}$
First ikrahion: 11 = -1 + 2 (0:5) = 3 (0:5)
N' = 1 (02) (02)
M, = -1.5/5
TM, = -0.3
N2 = 2+38 (0'5)=0'5
9.
N2= 319
[W2 = 0.3333]
N3 = 3-26(0'5) + 0'5/-7.
N3 = 2-5'/-7
[N32 -0.357]



Fourth iteration. V, = -1+2(0.33410)-3(-0.4092) N13 0.8 800/2 M= 0.1791 W2 = 2+3(0.2019) - (-0.4092) N2 = 3.0152/9 N2 = 0.33500. M3 = 3-2(0.2019) + (0.33418) N3: 2-9303/-7 M3 = -0.41860. Filth iteation ~ = -1+2 (0.3350) -3 (-0.4186) N, = 0.9258 M,= 0.1852. N2= 2+3(0,1391) - (-0, 4186) M2 = 2.9564/9 M2 = 0.3285. N3 = 3-2(0.1791)+(0.3380) N3= 2-97651-7 N3= -0.4252.

### **QUESTION # 02 (b):**

If number of iterations was not mentioned in the question, then what is the criteria to stop the solution of the problem when find the solution of Linear System of Equations? Also discuss the difference in Gauss Jacobi and Gauss Seidel method for solving system of linear equations? Should the system be diagonally dominant for gauss elimination method?



QUESTION # 03 (a): Approximate the given integral using Simpson's (1/3) Rule for n = 8.

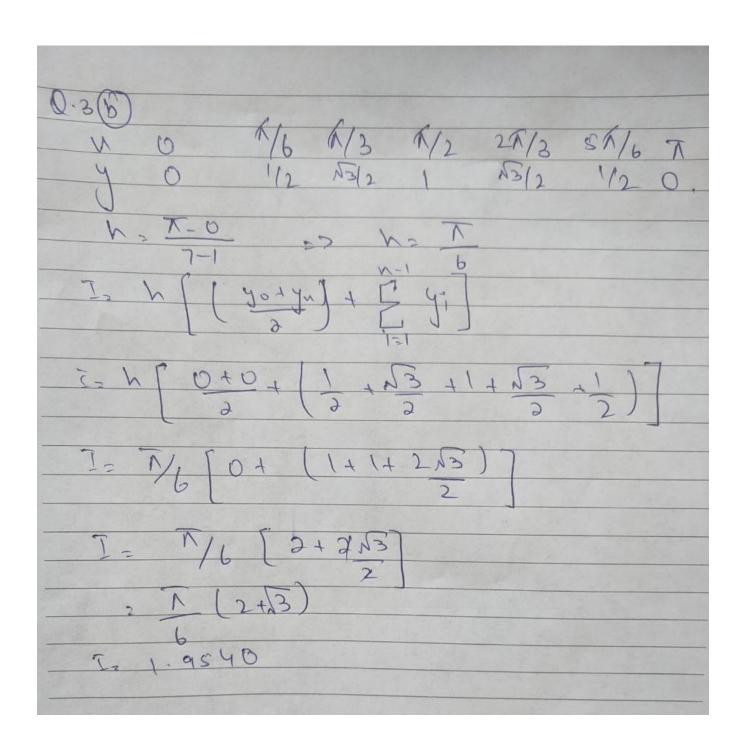
$$\int_{1}^{3} e^{x^2} dx$$

	371
0.360	
h= a-b	
N= Q=0	
N=3-1	=7 0-26
8	
4 F28	
3.	
- 1	2,7183
1.25	4-7707
1.00	9.4877
1.75	21.3809
2.00	54.5981
2-25	157.9849
5-58	518-0128
	8103.0839
3	8(0) 00).
T2 1/3 (2-718)	2)+(8103.0839)+4(4.7707+21.3809
+ 157.9	849+ 1924.6511) + 2/9.4877+54.5981
4 618.0	
720.25/3	8105.8022 + 8435.1511 + 1164.1974)
	( 5021.2075
1 5 6.78 (1	1703 130 17
7 4426.	2876
12	3
7= 1475-4	292,

# **QUESTION # 03 (b):**

Approximate the area  $y = \sin x$  on the interval  $[0, \pi]$  using the Trapezoidal Rule with the following data.

X	0	π/6	π/3	π/2	2π/3	5π/6	0
у	0	1/2	$\sqrt{3}/2$	1	$\sqrt{3}/2$	1/2	0



# **QUESTION # 04:**

Solve the differential equation,

$$y = x + y$$
;  $y(0) = 1$ 

in the interval [0,0.5] using Euler's method by taking h=0.1

val avan	1 .1 1
Fz. o [ , o] Comstni	; y(0)=1 n=0:1
1441MO [0, 10,2]	0 120,1
<b>N</b>	
0	N1 = N0+N
0.1	20401 2701
0.2 1.22	N2 2 W, + W
0.3 1.362	= 0.(40.(=) 0.5
0.4 1.8282	N32 W24 W
0.5 1.72102.	= 0.7+0.1=10.3
1 (210 L.	Nu = N31 h
Fox y = y + bli	2 0-34 0-(2) 0-4.
For y= yo + hfly,	J) NS 2 0.4 40.1 27 0.0
4 2 11	
For y= y, + h 21.	v 1
42= 1.1+ (0.1)	1 , 31
92= 1.1+0.17	
For y32 y2 + holl	V2 . 4. )
1-22+104	7(0-1.42)
	42 => 1-362.
For yy = y 3+ hf ( )	6. N3, Y2)
2 1-3624	0.17(1.662)
1.362+	0.1662
yy2 1.5282	
C I I N I N I	1 74)
0 - 01.628471	0.11(1.4587)
2 1.5282+	0,14,785
452 1-72 107	
J	