Chhatrapati Shahu Ji Maharaj University, Kanpur

Answer Script Details
Barcode 10497948

Roll No. 24079000007
Total Mark 48/75.00

Exam MASTER OF SCIENCE STATISTICS_ODD EXAM-DEC-2
Subject B060701T - LINEAR METHODS

Question wise Mark Summary

Q.No	Mark	Q.No	Mark	Q.No	Mark	Q.No	Mark
1A	3/5	7C	NA/3				
1B	4/5	7D	NA/3				
1C	3/5	8	NA/15				
1D	4/5	9	NA/15				
1E	3/5						
1F	4/5						
1G	3/5						
1H	2/5						
1I	2/5						
2	NA/15						
3	10/15						
4	NA/15						
5	NA/15						
6A	5/7						
6B	5/7						
7A	NA/3						
7B	NA/3						

Chhatrapati Shahu Ji Maharaj University
Kanpur, Uttar Pradesh

PART-I

Date of Exam: 27/01/25 Shift: 1st Room No.: 9

Paper Code: B060701T Subject: Statistics Year/Sem.: 1

Name of Candidate: Divya Dwivedi

Roll No.: 2407900000007

Signature of Candidate

Signature of Invigilator

COE Facsimile

PART-II

MARKS OBTAINED										
Q.	1	2	3	4	5	6	7	8	9	10
(a)										
(b)										
(c)										
(d)										
(e)										
(f)										
(g)										
(h)										
(i)										
(j)										
Total										
Total Marks in Figures									Max. Marks	
Total Marks in Words										

B060701T

Paper Code

Signature of Evaluator

PART-III

Course: MSC Statistics

Session: 2024-25 Year/Semester: 1

Subject: Statistics (linear Methods)

Paper Code: B060701T

Exam Date: 27012025

Name of Candidate: DIVYA DWIVEDI

Father's Name: SANTRAM DWIVEDI

महाविद्यालय का कोड College Code: KN03

परीक्षा केन्द्र का कोड Exam Centre Code: KN03

परीक्षा का प्रकार Type of Exam

Regular ● नियमित परीक्षार्थी Ex. Student ○

Private ○ बैक पेपर परीक्षा Back paper Exam ○

ANSWER BOOKLET NO.

10497948

B060701T

Paper Code

PART-IV

नामांकन संख्या Enrollment Number: CSJMA2400000038211

परीक्षार्थी अनुक्रमांक संख्या Candidate's Roll Number: 2407900000007

पेपर कोड Paper Code: B060701T

DIVYA

Signature of Candidate

Signature of Invigilator

C.S Facsimile

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नोट : 1. परीक्षार्थी को निर्देशित किया जाता है कि आवरण पृष्ठ के मुख भाग पर अंकित सभी निर्देशों को सावधानी पूर्वक पढ़ें।
2. बॉक्स में भरी जाने वाली प्रविष्टियाँ काली स्याही से भरी जाएँ। 3. गोलों को काले या नीले बॉलपेन से भरा जाएँ।

INSTRUCTIONS TO THE CANDIDATE FOR FILLING PART-I

1. Read the instructions carefully given on the answer script and admit card.
2. Write Date of Exam, Shift, Paper Code & Name of Subject Correctly.
3. Write Name & Roll No. Correctly.
4. Write Semester & Branch Correctly.

INSTRUCTIONS TO THE CANDIDATE FOR FILLING PART-III

1. Use blue or black ball point pen for writing alphabets & numerals in ☐ Boxes.
2. Carefully study the example before you start marking.
3. As shown in the example below blacken the circles completely.

4. Make no Stray marks on this sheet.
5. **DO NOT WRITE OR MARK ON THE BAR CODE.**

परीक्षार्थी के लिए निर्देश

1. प्रवेश पत्र एवं उत्तर पुस्तिका पर दिये गये निर्देशों को ध्यान से पढ़ें।
2. कवर पृष्ठ के दूसरी तरफ कुछ न लिखें।
3. उत्तर पुस्तिका के पृष्ठों पर दोनों तरफ लिखें।
4. प्रश्न पत्र पर अपने अनुक्रमांक के अतिरिक्त कुछ न लिखें।
5. प्रश्न पत्र कोड एवं प्रश्न पत्र कोड सावधानी पूर्वक लिखें।
6. अपनी स्थिति स्पष्ट लिखें।
7. उत्तर पुस्तिका के पृष्ठों की संख्या देखें। अगर उत्तर पुस्तिका में पृष्ठ (1–24) से कम है या फटे हुए है, तो परीक्षा शुरू होने के पूर्व दूसरी उत्तर पुस्तिका ले लें।
8. प्रश्नपत्र को देख, यदि प्रश्नपत्र के विषय कोड, विषय का नाम तथा प्रश्न में कोई त्रुटि है तो उसके परीक्षा शुरू होने के 30 मिनट के अन्दर कक्ष निरीक्षक को तत्काल सूचित करें, उसके बाद विश्वविद्यालय द्वारा कोई कार्यवाही नहीं की जायेगी।
9. प्रश्नों के उत्तर लिखने के लिये पेंसिल का प्रयोग न करें।
10. B कोपी या अतिरिक्त ग्राफ नहीं दिया जायेगा।

IN ORDER TO AVOID UFM (UNFAIR MEANS) :

1. The Roll No. and Answer Book no. found elsewhere or any other symbol found in the answer book will be treated as unfair means.
2. Any tempering of Bar Code and Booklet no shall be treated as Unfair Means.
3. Do Not bring the materials like slip of paper/mobile/digital diaries/ study material/ revision notes in examination hall. Possession of the mobiles/ digital diaries/ electronic watch and any other electronic gadget except memory less scientific calculator shall be considered as UFM case.
4. Do not keep or paste currency note in answer script it shall be consider as UFM.

INSTRUCTIONS TO THE CANDIDATE

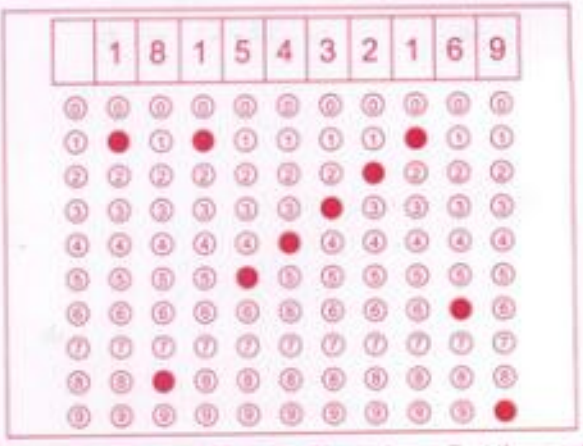
1. Read the instructions carefully given on the Question Paper, Admit Card & Answer Script.
2. Do not write anything on back side of the cover page.
3. Write on both sides of pages of answer book.
4. Do not write anything on question paper except Roll Number.
5. Write Paper Code & Question Paper Id carefully.
6. CHECK the number of pages (1-32) or any other kind of damage in your answer script, if found than change the answer script immediately before the commencement of examination.
7. CHECK the Question Paper for any kind of discrepancy e.g. Subject Code, Subject Name and Question of the Question Paper during first THIRTY MINUTES of the commencement of the exam, so that it can be corrected in TIME. After that no. corrections shall be entertained by the university.
8. Do not use pencil for answering the question.
9. Write status correctly e.g. those appearing in carry over papers should fill in status as Carry Over. Those appearing as Ex-Students should fill in status as ex.
10. No supplementary answer book & graph paper will be provided.

अनुचित साधन से बचने हेतु:

1. उत्तर पुस्तिका के निर्दिशित स्थान को छोड़कर अनुक्रमांक एवं उत्तरपुस्तिका का क्रमांक कहीं और न लिखे तथा कोई भी चिन्ह न बनायें क्योंकि यह अनुचित साधन प्रयोग की परिधि में आता है।
2. उत्तर पुस्तिका के बारकोड अथवा उत्तर पुस्तिका संख्या पर छेड़ करने पर अनुचित साधन प्रयोग माना जावेगा।
3. परीक्षा कक्ष में निम्न वस्तुएं साथ न लाये, जैसे लिखे हुए कागज के टुकड़े, मोबाईल, डिजिटल डायरी, कोपी, पुस्तक यह सभी वस्तुएं जो अनुचित साधन के अन्तर्गत आती है। केवल संबंधित प्रश्नपत्र में ही मेमोरी लैस साइटफिक केल्कुलेटर ले जाने की अनुमन्यता होगी।
4. उत्तर पुस्तिकाओं में कागजे न रखे न ही उत्तर पुस्तिका में चिपकायें। ऐसा करना अनुचित साधन प्रयोग की परिधि में आता है।

INSTRUCTIONS TO THE CANDIDATE FOR FILLING PART-IV

1. Use blue or black ball point pen for writing alphabets & numberals in ☐ Boxes.
2. Use blue or black ball point pen for filling the circles.



Note - If your Roll No. is of 10 digits. Please leave first three columns.

Paper Code

B 0 6 0 7 0 1 T

01

Do not write anything in this Portion

Section-A

1.

a

The Rank of matrix represent the Idenpentancy of the matrix of vaeiable

If Rank(ρ) is less than the unknown than it is consisted and Unique. for obtaining the rank the upper triangular matrix should be zero, than rank is of 2

$$\rho(A) = \begin{bmatrix} 0 & 2 & 1 \\ 0 & 0 & 3 \\ 1 & 4 & 3 \end{bmatrix}$$

b Orthogonal Matrix -

~ A Square Matrix A which is

$$AA^T = I = A^TA = I$$

is called Orthogonal Matrix

where

I is the Identity Matrix.

c In Orthogonalisation Matrix, the Matrix is $AA^T = I$ H is the transpose of the matrix while in the diagonalization H is the sum of the diagonal elements of the Matrix.

$\begin{bmatrix} 1 & 4 & 3 \\ 2 & 4 & 1 \\ 1 & 2 & 3 \end{bmatrix}$ the diagonal elements of Orthogonal is a square matrix whose transpose is identity as diagonal element.

d. Gram-Schmidt Orthogonalization Method-

Suppose $B = \{\beta_1, \beta_2 \dots \beta_n\}$ are the dimension of matrix of Innerproduct space say V and $A = \{\alpha_1, \alpha_2 \dots \alpha_n\}$ are the Orthonormal of the Basis then,

$$\alpha_1 = \frac{\beta_1}{\|\beta_1\|} \qquad \alpha_2 = \frac{\gamma_2}{\|\gamma_2\|}$$

$$\alpha_3 = \frac{\gamma_3}{\|\gamma_3\|}$$

where,

$$\gamma_2 = \beta_2 - \langle \beta_2 \alpha_1 \rangle \alpha_1$$

$$\gamma_3 = \beta_3 - \langle \beta_3 \alpha_2 \rangle \beta_2 \alpha_1$$

(e) System of linear equation

$$\begin{bmatrix} a_1z + b_1x + c_1x \\ a_2y + b_2y + c_2y \\ a_3z + b_3z + c_3z \end{bmatrix} = \begin{bmatrix} d_1 \\ d_2 \\ d_3 \end{bmatrix}$$

a_1x

We know that the equation -

$$\begin{bmatrix} a_1x + b_1y + c_1z \\ a_2x + b_2y + c_2z \\ a_3x + b_3y + c_3z \end{bmatrix} = \begin{bmatrix} d_1 \\ d_2 \\ d_3 \end{bmatrix}$$

$$\begin{bmatrix} a_1 + b_1 + c_1 \\ a_2 + b_2 + c_2 \\ a_3 + b_3 + c_3 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} d_1 \\ d_2 \\ d_3 \end{bmatrix}$$

For the above Equation We use different Methods to Solve it.

Homogeneous Method -

In Homogeneous Method the Eqn is

$$\boxed{AX = 0}$$

A be any Square Matrix
X be any column Matrix

(ii) By Obtaining the Rank of Matrix (Matrix Method)

To obtain the desired Matrix we use Rank Method in which we reduce the Matrix to Obtain the Result.

let, $\begin{bmatrix} 1 & 0 & 2 \\ 1 & 1 & 2 \\ 0 & 1 & 1 \end{bmatrix}$

In this matrix we reduce the lower matrix.

if the upper triangular Matrix be zero

$\begin{bmatrix} 1 & 0 & 2 \\ 0 & 0 & 1 \\ 0 & 0 & 0 \end{bmatrix}$

If we get last row zero then, $\rho(A) \leq 3$

Rank should less than 3

(iii) By obtaining Adjoint -.
(Non homogenous Matrix)

the equation for this

$AX = B$

$\boxed{X = A^{-1}B}$

from here we obtain the Inverse of A and then we multiply A with B

to obtain the desired matrix

(A) Generalized Inverse

for square Matrix of size nxn let 'A' then the matrix of size nxn is the inverse of the matrix

$$AG_1A = A$$

Elementary Properties of the generalised Inverse -

- Existence - for every square Matrix there should be ~~one~~ atleast one generalised inverse.
- Uniqueness - every matrix in generalised inverse is not necessary to be unique until addition condition applied on it i.e. Moore penrose pseudo inverse
- Idempotentomcy - Matrix in generalised inverse show Idempotency by $A^2 = A$
- Commutative - The generalised inverse matrix is not commutative in nature

$$GA \neq AG_1$$

The linear equation -

(g) $AX = B$

$$\begin{bmatrix} a_1x + b_1x + c_1x \\ a_2y + b_2y + c_2y \\ a_3z + b_3z + c_3z \end{bmatrix} = \begin{bmatrix} a_1 \\ d_2 \\ d_3 \end{bmatrix}$$

$$\begin{bmatrix} a_1 + b_1 + c_1 \\ a_2 + b_2 + c_2 \\ a_3 + b_3 + c_3 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} \\ 0 \\ \end{bmatrix}$$

(h) for characteristic roots - The equation

We know of characteristic root by equation called characteristic equation

$$|A - \lambda I| = 0$$

where - A is matrix (squ

I - Identity (Matrix)

from the equation We find the value of λ.

for 2×2 Matrix –

$\lambda^2 - (\text{Trace of } A)\lambda + \text{determinant } |A|$

for 3×3 Matrix

$\lambda^3 - (\text{Trace of } A)\lambda^2 + (\text{Sum of Minor element}) + \text{determinant } |A|$

When we get value of λ we can make the characteristic equation by using the value of λ. the obtaining value of λ is called characteristic roots (eigen values) of a matrix.

(i) Idempotent Matrix –

The Square Matrix $A^2 = A$ is known as Idempotent Matrix

If we take Identity Matrix as A, then,

$$A^2 = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

We get

$$A = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

which shows the Idempotency of the matrix.

Kong

(g) WKT,

the system of linear equation -

$$a_1x + b_1x + c_1x = d_1$$
$$a_2y + b_2y + c_2y = d_2$$
$$a_3z + b_3z + c_3z = d_3$$

$$\begin{bmatrix} a_1 + b_1 + c_1 \\ a_2 + b_2 + c_2 \\ a_3 + b_3 + c_3 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} d_1 \\ d_2 \\ d_3 \end{bmatrix}$$

for solving this equation to have a unique solution the matrix should be Consistent. the solution is non Trivial which is less than the unknown

for getting unique solution

let the given matrix -

$$\begin{bmatrix} 2 & 2 & 2 \\ 1 & 3 & 1 \\ 2 & 2 & 2 \end{bmatrix}$$

On solving

$R_3 \rightarrow R_1 - R_3$

$$\begin{bmatrix} 2 & 2 & 2 \\ 1 & 3 & 1 \\ 0 & 0 & 0 \end{bmatrix}$$

from above we get rank $\rho(A) < 3$

$\boxed{\rho(A) = 2}$

Which is less than the ~~trivial~~ unknown.

So given soln is unique.

long Answer Type

3. $x + 2y - 3z = 9$

$2x - y + z = 0$

$3x + 4y + z = 7$

$$\begin{bmatrix} 1 & 2 & -3 \\ 2 & -1 & 1 \\ 3 & 4 & 1 \end{bmatrix} = \begin{bmatrix} 9 \\ 0 \\ 7 \end{bmatrix}$$

$AX = B$

$X = A^{-1}B$

We have to find Inverse -

$$\begin{bmatrix} 1 & 2 & -3 \\ 2 & -1 & 1 \\ 3 & 4 & 1 \end{bmatrix}$$

$1(-1 \times 1) - 2(2 \times 1 + 3 \times 1) - 3(4 \times 2 + 3)$

$(-1 - 4) - 2(2 + 3) - 3(8 + 3)$

$3 - 2(-1) - 3(11)$

$3 + 2 - 33 = -5 + 2 - 33$

-36

Paper Code

11

Adj A

$$\begin{bmatrix} 1 & 2 & -3 \\ 2 & -1 & 1 \\ 3 & 4 & 1 \end{bmatrix} \qquad \begin{matrix} + & - & + \\ - & + & - \\ + & - & + \end{matrix}$$

$$\begin{vmatrix} 1 & 2 \\ 2 & -1 \end{vmatrix}$$

$$\begin{vmatrix} -1 & 1 \\ 4 & 1 \end{vmatrix} - \begin{vmatrix} 2 & 1 \\ 3 & 1 \end{vmatrix} \quad \begin{vmatrix} 2 & -1 \\ 3 & 4 \end{vmatrix}$$

$$- \begin{vmatrix} 2 & -3 \\ 4 & 1 \end{vmatrix} \quad \begin{vmatrix} 1 & -3 \\ 3 & 1 \end{vmatrix} - \begin{vmatrix} 1 & 2 \\ 3 & 4 \end{vmatrix}$$

$$\begin{vmatrix} 2 & -3 \\ -1 & 1 \end{vmatrix} - \begin{vmatrix} 1 & -3 \\ 2 & 1 \end{vmatrix} \quad \begin{vmatrix} 1 & 2 \\ 2 & -1 \end{vmatrix}$$

$$|-1-4| - 2|2-3| + |8+3|$$

$$-|2+12| + |1+9| - |4-6|$$

$$|2+3| - |1+6| + |-1-4|$$

$$\begin{matrix} -5 & +2 & +11 \\ -10 & +10 & +2 \\ 5 & -7 & -5 \end{matrix} = \begin{bmatrix} -5 \end{bmatrix}$$

$$\begin{bmatrix} -5 & 2 & 11 \\ -10 & 10 & 2 \\ 5 & -7 & -5 \end{bmatrix} \begin{bmatrix} 9 \\ \end{bmatrix}$$

$$A^{-1} = \frac{Adj|A|}{det|A|}$$

$$A^{-1} = \begin{bmatrix} +5/36 & -2/36 & -11/36 \\ +10/36 & 10/36 & -2/36 \\ -5/36 & 7/36 & 5/36 \end{bmatrix}$$

$A^{-1}X$

$$\begin{bmatrix} \frac{5}{36} & \frac{-2}{36} & \frac{-11}{36} \\ 10/36 & -10/36 & -2/36 \\ -5/36 & 7/36 & +5/36 \end{bmatrix} \begin{bmatrix} 9 \\ 8 \\ 7 \end{bmatrix}$$

$\frac{5}{36} \times 9$ $\quad \frac{-2}{36} \times 9$ $\quad \frac{-11}{36} \times 9$

$\frac{10}{36} \times 8$ $\quad \frac{-10}{36} \times 8$ $\quad \frac{-2}{36} \times 8$

$\frac{-5}{36} \times 7$ $\quad \frac{7}{36} \times 7$ $\quad \frac{+5}{36} \times 7$

$\frac{5}{4} \quad -\frac{1}{2} \quad -\frac{11}{4}$

$\frac{20}{9} \quad -\frac{20}{9} \quad -\frac{1}{9}$

$\frac{35}{36} \quad \frac{49}{36} \quad \frac{35}{36}$

$$X = \begin{bmatrix} 5/4 & -1/2 & -11/4 \\ 20/9 & -20/9 & -1/9 \\ 35/36 & 49/36 & 35/36 \end{bmatrix}$$ Ans

Section C

Long Answer Type.

(6) $$A = \begin{bmatrix} 4 & 1 & 2 \\ 1 & 4 & 1 \\ 2 & 1 & 3 \end{bmatrix}$$

To find the Eigen value we have to find λ

$$A - \lambda I = 0$$

$$\begin{bmatrix} 4 & 1 & 2 \\ 1 & 4 & 1 \\ 2 & 1 & 3 \end{bmatrix}$$

$\lambda^3 - (10)\lambda^2 - 29\lambda^2 + 29$

$4^2 + 1^2 + 2$
$16+4+1$

$4(11) - 1(3-2) + 2(1-0)$

$44 - 1 + 2(-7)$
$44 - 1 - 14$
$29 - 1$
$30 - 1$
29

$16+1+4$
$17+4$
21

$4(11-1)-1$

$\lambda^3 - 11\lambda^2 - 21\lambda + 29$

$\lambda(\lambda^2 - 10\lambda + 21) + 29 = 0$

$\lambda(\lambda^2 - (7+3)\lambda - 21) + 29$

$\lambda = 7, -3$
$+29$

from this we get
eigen value

$\lambda = 7, -3, 29$

(ii) AAA

$$\begin{bmatrix} 4 & 1 & 2 \\ 1 & 4 & 1 \\ 2 & 1 & 3 \end{bmatrix}$$

$$AA \begin{bmatrix} 4 & 1 & 2 \\ 1 & 4 & 1 \\ 2 & 1 & 3 \end{bmatrix} \begin{bmatrix} 4 & 1 & 2 \\ 1 & 4 & 1 \\ 2 & 1 & 3 \end{bmatrix}$$

$$\begin{bmatrix} 16+5 & 10 & 12 \\ 4+6 & 18 & 8 \\ 15 & 9 & 15 \end{bmatrix}$$

$$A^2 \begin{bmatrix} 21 & 10 & 12 \\ 10 & 18 & 8 \\ 15 & 9 & 15 \end{bmatrix}$$

$$A^2A \begin{bmatrix} 21 & 10 & 12 \\ 10 & 18 & 8 \\ 15 & 9 & 15 \end{bmatrix} \begin{bmatrix} 4 & 1 & 2 \\ 1 & 4 & 1 \\ 2 & 1 & 3 \end{bmatrix}$$

$$\begin{bmatrix} 21\times4+10+24 & 21+40+12 & 42+10+36 \\ 40+18+16 & 10+72+8 & 20+18+24 \\ 60+9+30 & 15+36+15 & 30+9+45 \end{bmatrix}$$

Paper Code

41 16

$$\begin{bmatrix} 84+24 & 73 & 88 \\ 64 & 90 & 62 \\ 99 & 66 & 75+9 \end{bmatrix}$$

$$\begin{bmatrix} 108 & 73 & 88 \\ 64 & 90 & 62 \\ 99 & 66 & 84 \end{bmatrix}$$

$\lambda^3 - (\text{Trace of } A)\lambda^2 - (\text{sum of minor})\lambda - |adj A|$

$\lambda^3 - (282)\lambda^2 + (10269\lambda) - (232)$

$\lambda(\lambda^2 - 282\lambda + 269\lambda) - 23220$

$\lambda = 230$

λ eigen value

9. Testing of General linear Hypothesis

In Normality We use two test

T Test and f test

T Test -

T test is a s.

Paper Code

18

Do Not Write anything in this Portion

Do not write anything in this Portion

Paper Code

20

Do Not Write anything in this Portion

Paper Code

21

Do Not Write anything in this Portion

$$\begin{bmatrix} 1 & 2 & -3 \\ 2 & -1 & 1 \\ 3 & 4 & 1 \end{bmatrix}$$

$1(1\times -1 - 4) - 2(2-3) + 3(8+3)$

$(-1-4) - 2(-1) - 3(11)$

$-5 + 2 - 33$

$-3 - 33$

$$\begin{bmatrix} 4 & 1 & 2 \\ 1 & 4 & 1 \\ 2 & 1 & 3 \end{bmatrix} \begin{bmatrix} 4 & 1 & 2 \\ 1 & 4 & 1 \\ 2 & 1 & 3 \end{bmatrix}$$

$$\begin{bmatrix} 4\times4+1\times1+2\times2 & 4\times1+1\times4+2\times1 & 4\times2+1\times1+3\times2 \\ 1\times4+4+2 & 1+16+1 & \cancel{1\times}\ 2+4+3 \\ 8+1+6 & 2+4+3 & 4+1+9 \end{bmatrix}$$

$$\begin{bmatrix} 16+5 & 10 & 12 \\ 4+6 & 18 & 8 \\ 15 & 9 & 15 \end{bmatrix}$$

$$\begin{bmatrix} 21 & 10 & 12 \\ 10 & 18 & 8 \\ 15 & 9 & 15 \end{bmatrix}$$

X

Do not write anything in this Portion

Paper Code

$\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ =

20
10
24

2

$\begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix} \begin{bmatrix} -1 & 2 \\ 2 & 1 \end{bmatrix}$

$\begin{bmatrix} 1\times1+2 & 1\times2+ \end{bmatrix} \begin{bmatrix} 1\times1+1\times2 & 2\times2+1\times1 \\ 2\times1+2 & 2\times2+1 \end{bmatrix} \begin{bmatrix} 1+2 & 2+1 \\ 4 & 5 \end{bmatrix}$

$\begin{bmatrix} 1\times1+4 & 1\times2+2\times1 \\ 1\times1+2 & \end{bmatrix} \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \begin{bmatrix} -1 & 0 \\ 0 & -1 \end{bmatrix} \begin{bmatrix} 3 & 3 \\ 4 & 5 \end{bmatrix}$

$\begin{bmatrix} 1\times1+1\times2 & 2\times1+2\times2 \\ 2\times1+1\times2 & 2\times2+1\times1 \end{bmatrix}$

$\begin{bmatrix} 1+2 & -2+4 \\ -2+2 & 4+1 \end{bmatrix} = \begin{matrix} 3 & 2 \\ 0 & 5 \end{matrix}$

$\begin{bmatrix} 2 & 2 & 3 \\ 1 & 2 & 1 \\ 2 & 2 & 2 \end{bmatrix}$ ~~$\begin{bmatrix} 2 & 2 & 2 \\ 1 & 2 & 1 \\ 1 & 2 & 2 \end{bmatrix}$~~

$\begin{pmatrix} 3 & x \\ 5 & 6 \end{pmatrix}$

$2\times6 \rightarrow 9+5$

$R_3 \rightarrow R_1 - R_3$

$\begin{bmatrix} 2 & 2 & 1 \\ 1 & 1 & 2 \\ 0 & 0 & 0 \end{bmatrix}$

$R_3 \rightarrow R_1 - R_3$

$\begin{bmatrix} 2 & 2 & 3 \\ 1 & 2 & 1 \\ 0 & 0 & 1 \end{bmatrix}$

$R_2 - R_3$

$R_3 \rightarrow R_2 - R_3$

$\begin{bmatrix} 2 & 2 & 3 \end{bmatrix}$