مشق 6.5

ا درج ذیل قالبوں کے مقطع معلوم سیجیے۔

(i)
$$\begin{bmatrix} u & v \\ x & y \end{bmatrix}$$
 (ii) $\begin{bmatrix} -2 & 5 \\ 1 & 4 \end{bmatrix}$ (iii) $\begin{bmatrix} -8 & -4 \\ -4 & -2 \end{bmatrix}$ (iv) $\begin{bmatrix} \frac{1}{1} & \frac{3}{8} \\ \frac{1}{8} & \frac{1}{4} \end{bmatrix}$

(i) $\begin{bmatrix} u & v \\ x & y \end{bmatrix}$

$$X = \begin{vmatrix} u & v \\ x & y \end{vmatrix}$$

$$|X| = \begin{vmatrix} u & v \\ x & y \end{vmatrix}$$

$$= uy - vx$$
(ii) $\begin{bmatrix} -2 & 5 \\ 1 & 4 \end{bmatrix}$

$$A = \begin{bmatrix} -2 & 5 \\ 1 & 4 \end{bmatrix}$$
$$|A| = \begin{vmatrix} -2 & 5 \\ 1 & 4 \end{vmatrix}$$

$$\begin{vmatrix} 1 & 4 \\ = (-2)(4) - (5)(1) \\ = -8 - 5 \\ = -13 \end{vmatrix}$$

$$\begin{vmatrix} -8 & -4 \\ 4 & 2 \end{vmatrix}$$

(iii)
$$\begin{bmatrix} -8 & -4 \\ -4 & -2 \end{bmatrix}$$
$$B = \begin{bmatrix} -8 & -4 \\ -4 & -2 \end{bmatrix}$$
$$|B| = \begin{vmatrix} -8 & -4 \\ -4 & -2 \end{vmatrix}$$

$$B = \begin{bmatrix} -8 & -4 \\ -4 & -2 \end{bmatrix}$$

$$|B| = \begin{vmatrix} -8 & -4 \\ -4 & -2 \end{vmatrix}$$

$$= (-8)(-2) - (-4)(-4)$$

$$= 16 - 16$$

$$= 0$$

$$B = \begin{vmatrix} -4 & -2 \\ -4 & -2 \end{vmatrix}$$

$$|B| = \begin{vmatrix} -8 & -4 \\ -4 & -2 \end{vmatrix}$$

$$= (-8)$$

$$= 16 -$$

$$= 0$$

$$B = \begin{bmatrix} -8 & -4 \\ -4 & -4 \end{bmatrix}$$
$$|B| = \begin{vmatrix} -8 & 4 \\ -4 & -4 \end{vmatrix}$$
$$= (-4)$$
$$= 16$$
$$= 0$$

$$|B| = \begin{vmatrix} -4 & -2 \\ -4 & -2 \end{vmatrix}$$

$$= (-8)(-6)$$

$$= 16 - 16$$

$$|B| = \begin{vmatrix} -4 & -2 \end{vmatrix}$$
= (-8) (-2) - (-4) (-4)
= 16 - 16
= 0
$$\begin{bmatrix} 1 & 3 \end{bmatrix}$$

$$= (-8)^{2}$$

$$= 16^{2}$$

$$= 0$$
(iv)
$$\begin{bmatrix} \frac{1}{1} & \frac{3}{8} \\ \frac{1}{1} & \frac{1}{4} \end{bmatrix}$$

$$\begin{vmatrix} B \\ = \begin{vmatrix} -8 \\ -4 \end{vmatrix} = \begin{vmatrix} -8 \\$$

$$|\mathbf{B}| = \begin{vmatrix} -4 & -4 \\ = (-8) \\ = 16 \\ = 0 \end{vmatrix}$$

 $C = \begin{bmatrix} \frac{1}{1} & \frac{3}{8} \\ \frac{1}{8} & \frac{1}{4} \end{bmatrix}$

مل: فرض کیا

$$= (1)\left(\frac{1}{4}\right) - \left(\frac{3}{8}\right)\left(\frac{1}{8}\right)$$

$$= \frac{1}{4} - \frac{3}{64}$$

$$|C| = \frac{16 - 3}{64} = \frac{13}{64}$$

ن اور اور فير تا در قالوں كو الگ الگ يجيے۔
$$\begin{bmatrix}
-1 & 3 \\
1 & -3
\end{bmatrix} \qquad (ii) \begin{bmatrix}
3 & 8 \\
4 & 9
\end{bmatrix} \qquad (iii) \begin{bmatrix}
-a & b \\
a & b
\end{bmatrix}$$

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

(i)
$$\begin{bmatrix} -1 & 3 \\ 1 & -3 \end{bmatrix}$$

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$$-0$$

$$A = \begin{bmatrix} -1 & 3 \\ 1 & -3 \end{bmatrix}$$

$$|A| = \begin{vmatrix} -1 & 3 \\ 1 & -3 \end{vmatrix}$$

$$= (-1)(-3) - (3)(1)$$

$$= 3 - 3$$

$$= 0$$

 $\begin{bmatrix} -1 & 3 \\ 1 & -3 \end{bmatrix}$ اور قالب ہے۔

(ii)
$$\begin{bmatrix} 3 & 8 \\ 4 & 9 \end{bmatrix}$$

$$B = \begin{bmatrix} 3 & 8 \\ 4 & 9 \end{bmatrix}$$

$$|B| = \begin{vmatrix} 3 & 8 \\ 4 & 9 \end{vmatrix}$$

$$= 3 \times 9 - 8 \times 4$$

$$|B| = \begin{vmatrix} 4 & 9 \end{vmatrix}$$

= 3 × 9 - 8 × 4
= 27 - 32
 $|B| = -5$
 $|B| = -5$

(iii)
$$\begin{bmatrix} -a & b \\ a & b \end{bmatrix}$$

$$C = \begin{bmatrix} -a & b \\ a & b \end{bmatrix}$$
$$|C| = \begin{vmatrix} -a & b \\ a & b \end{vmatrix}$$
$$= -ab - ab$$

(i)
$$\begin{bmatrix} 1 & 2 \\ 1 & 3 \end{bmatrix}$$
 (ii) $\begin{bmatrix} 2 & 1 \\ 5 & 3 \end{bmatrix}$ (iii) $\begin{bmatrix} 2 & 0 \\ -1 & 3 \end{bmatrix}$ (iv) $\begin{bmatrix} -6 & 4 \\ 3 & -2 \end{bmatrix}$

(v)
$$\begin{bmatrix} 1 & 3 \\ 2 & 8 \end{bmatrix}$$
 (vi) $\begin{bmatrix} -1 & 0 \\ 0 & -1 \end{bmatrix}$ (vii) $\begin{bmatrix} \frac{3}{5} & \frac{-4}{5} \\ \frac{4}{2} & \frac{3}{3} \end{bmatrix}$

$$(i) \qquad \begin{bmatrix} 1 & 2 \\ 1 & 3 \end{bmatrix}$$

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

$$\Rightarrow |A| = \begin{vmatrix} 1 & 2 \\ 1 & 3 \end{vmatrix}$$

$$|A| = 1(3) - 2(1)$$

$$= 3 - 2$$

= 1

$$Adj (A) = \begin{bmatrix} 3 & -2 \\ -1 & 1 \end{bmatrix}$$

$$\begin{bmatrix} -a & b \\ a & b \end{bmatrix}$$
ایک غیرنا در قالب ہے $A-1$ کا ضرفی معکوں $A-1$ م

مان کریں۔

$$\begin{bmatrix} -6 & 4 \\ 3 & -2 \end{bmatrix}$$

چونکہ $A \neq A$ ہمکن ہے۔

$$A^{-1} = \frac{Adj(A)}{|A|} \qquad \text{if } A^{-1} = \frac{Adj(A)}{|A|}$$

$$A^{-1} = \frac{\begin{bmatrix} 3 & -2 \\ -1 & 1 \end{bmatrix}}{1}$$

$$A^{-1} = \frac{2}{1}$$

$$A^{-1} = \begin{bmatrix} 3 & -2 \\ -1 & 1 \end{bmatrix}$$

$$A^{-1} = \begin{bmatrix} 3 & -2 \\ 1 & 1 \end{bmatrix}$$

$$A^{-1} = \begin{bmatrix} 3 & -2 \\ 1 & 1 \end{bmatrix}$$

$$A^{-1}A = \begin{bmatrix} 3 & -2 \\ -1 & 1 \end{bmatrix} \begin{bmatrix} 1 & 2 \\ 1 & 3 \end{bmatrix}$$

$$= \begin{bmatrix} 3(1) + (-2)(1) & 3(2) + (-2)(3) \\ (-1)(1) + (1)(1) & (-1)(2) + (1)(3) \end{bmatrix}$$

$$= \begin{bmatrix} 3(1) & 2(1) & 3(2) & 1(2)(3) \\ (-1)(1) & + (1)(1) & (-1)(2) & + (1)(3) \end{bmatrix}$$

$$= \begin{bmatrix} 3-2 & 6-6 \\ -1+1 & -2+3 \end{bmatrix}$$

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

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

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

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

(ii)
$$\begin{bmatrix} 2 & 1 \\ 5 & 3 \end{bmatrix}$$
$$A = \begin{bmatrix} 2 & 1 \\ 5 & 3 \end{bmatrix}$$

$$\begin{bmatrix} 5 & 3 \end{bmatrix}$$

$$A = \begin{bmatrix} 2 & 1 \\ 5 & 3 \end{bmatrix}$$

$$|A| = \begin{vmatrix} 2 & 1 \\ 5 & 3 \end{vmatrix}$$

$$A = \begin{bmatrix} 2 & 1 \\ 5 & 3 \end{bmatrix}$$
$$|A| = \begin{vmatrix} 2 & 1 \\ 5 & 3 \end{vmatrix}$$

$$A = \begin{bmatrix} 5 & 3 \end{bmatrix}$$

$$|A| = \begin{vmatrix} 2 & 1 \\ 5 & 3 \end{vmatrix}$$

$$= 2 \times 3 - 1 \times 5$$

$$|A| = \begin{vmatrix} 2 & 1 \\ 5 & 3 \end{vmatrix}$$

$$= 2 \times 3 - 1 \times 5$$

$$= 6 - 5$$

$$= 1$$

$$\Rightarrow |A| = \begin{vmatrix} 2 & 1 \\ 5 & 3 \end{vmatrix}$$

$$= 2 \times 3 - 1 \times 5$$

$$= 6 - 5$$

$$= 1$$

$$|A| = \begin{vmatrix} 2 & 1 \\ 5 & 3 \end{vmatrix}$$

$$= 2 \times 3 - 1 \times 5$$

$$= 6 - 5$$

$$= 1$$

$$|A| = \begin{vmatrix} 2 & 1 \\ 5 & 3 \end{vmatrix}$$

= 2 × 3 - 1 × 5
= 6 - 5
= 1

 $Adj(A) = \begin{bmatrix} 3 & -1 \\ -5 & 2 \end{bmatrix}$

$$Adj (A) = \begin{bmatrix} 3 & -1 \\ -5 & 2 \end{bmatrix}$$

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

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

 $A^{-1} = \begin{bmatrix} 3 & -1 \\ -5 & 2 \end{bmatrix}$

چونکہ
$$A^{-1}$$
 ہمکن ہے۔ $A \neq A^{-1}$ جاس کیے

چونکیه

حل: فرض كيا

$$A^{-1} = \begin{bmatrix} 3 & -1 \\ -5 & 2 \end{bmatrix}$$

$$A^{-1}A = \begin{bmatrix} 3 & -1 \\ -5 & 2 \end{bmatrix} \begin{bmatrix} 2 & 1 \\ 5 & 3 \end{bmatrix}$$

$$A^{-1}A = \begin{bmatrix} 3 & -1 \\ -5 & 2 \end{bmatrix} \begin{bmatrix} 2 & 1 \\ 5 & 3 \end{bmatrix}$$

$$A = \begin{bmatrix} -5 & 2 \end{bmatrix} \begin{bmatrix} 5 & 3 \end{bmatrix}$$

$$= \begin{bmatrix} 3(2) + (-1)(5) & 3(1) + (-1)(3) \\ (-5)(2) + (2)(5) & (-5)(1) + 2(3) \end{bmatrix}$$

$$= \begin{bmatrix} 3(2) + (-1)(5) & 3(1) + (-1)(3) \\ (-5)(2) + (2)(5) & (-5)(1) + 2(3) \end{bmatrix}$$

$$= \begin{bmatrix} 6 - 5 & 3 - 3 \end{bmatrix}$$

$$= \begin{bmatrix} (-5)(2) + (2)(5) & (-5)(1) + 2(3) \end{bmatrix}$$

$$= \begin{bmatrix} 6 - 5 & 3 - 3 \\ -10 + 10 & -5 + 6 \end{bmatrix}$$

$$\begin{bmatrix} -10+10 & -5+6 \end{bmatrix}$$

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

(iii)
$$\begin{bmatrix} 2 & 0 \\ -1 & 3 \end{bmatrix}$$

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

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

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

$$\Rightarrow |A| = \begin{vmatrix} 2 & 0 \\ -1 & 3 \end{vmatrix}$$

$$\Rightarrow |A| = \begin{vmatrix} 2 & 0 \\ -1 & 3 \end{vmatrix}$$

$$\begin{vmatrix} -1 & 3 \\ = 2 \times 3 - 0 \times (-1) = 6 - 0 \\ | = 6 \end{vmatrix}$$

=
$$2 \times 3 - 0 \times (-1) = 6 - 0$$

= 6
 $\Rightarrow A^{-1} = A$
 $\Rightarrow A^{-1} = A$

$$| = 6$$

$$\Rightarrow A^{-1}$$

لبذا

$$|A| = \begin{vmatrix} 2 & 0 \\ -1 & 3 \end{vmatrix}$$
= 2 × 3 - 0 × (-1) = 6 - 0
$$|A| = 6$$

$$= 2 \times 3 - 0 \times (-1) = 6 - 0$$

$$|A| = 6$$

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

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

 $A^{-1} = \frac{Adj(A)}{(A)}$

 $A^{-1} = \frac{\begin{bmatrix} 3 & 0 \\ 1 & 2 \end{bmatrix}}{6}$

 $A^{-1} = \frac{1}{6} \begin{bmatrix} 3 & 0 \\ 1 & 2 \end{bmatrix}$

 $= \begin{bmatrix} \frac{3}{6} & \frac{0}{6} \\ \frac{1}{6} & \frac{2}{6} \end{bmatrix}$

=
$$2 \times 3 - 0 \times (-1) = 6 - 0$$

 $|A| = 6$

$$|A|^{-1} = |A| = 0$$

$$|A| = 0$$

$$= 2 \times 3 - 0 \times (-1) = 6 - 0$$

$$|A| = 6$$

$$\Rightarrow A^{-1} \cup A \neq 0 \quad \Rightarrow A^{-1} \cup A \neq 0$$

$$A^{-1} = \begin{bmatrix} \frac{1}{2} & 0 \\ \frac{1}{6} & \frac{1}{3} \end{bmatrix}$$

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

$$A^{-1}A = \begin{bmatrix} \frac{1}{2} & 0 \\ \frac{1}{6} & \frac{1}{3} \end{bmatrix} \begin{bmatrix} 2 & 0 \\ -1 & 3 \end{bmatrix}$$
$$= \begin{bmatrix} \frac{1}{2} \times (2) + 0(-1) & \frac{1}{2}(0) + 0(3) \\ \frac{1}{6} \times (2) + \frac{1}{3}(-1) & \frac{1}{6}(0) + \frac{1}{3}(3) \end{bmatrix}$$

$$\begin{bmatrix} \frac{1}{6} \times (2) + \frac{1}{3}(-1) & \frac{1}{6}(-1) \\ = \begin{bmatrix} 1 - 0 & 0 \\ \frac{1}{3} - \frac{1}{3} & 0 + 1 \end{bmatrix}$$

$$= \begin{bmatrix} \frac{1}{3} - \frac{1}{3} & 0 + 1 \\ A^{-1}A = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} = I$$

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

$$A = \begin{bmatrix} -6 & 4 \\ 3 & -2 \end{bmatrix}$$

$$A = \begin{bmatrix} -6 & 4 \\ 3 & -2 \end{bmatrix}$$

$$|A| = \begin{bmatrix} -6 & 4 \end{bmatrix}$$

$$A = \begin{bmatrix} 3 & -2 \end{bmatrix}$$
$$|A| = \begin{vmatrix} -6 & 4 \\ 3 & -2 \end{vmatrix}$$

$$A = \begin{bmatrix} 3 & -2 \\ 4 \end{bmatrix} = \begin{bmatrix} -6 & 4 \\ 3 & -2 \end{bmatrix}$$

$$|A| = \begin{vmatrix} 3 & -2 \\ -6 & 4 \\ 3 & -2 \end{vmatrix}$$
$$= (-6)(-2) - (4)(3)$$

$$|A| = \begin{vmatrix} -6 \\ 3 \end{vmatrix}$$
$$= (-6) (6$$

$$= 12 - 12$$

$$|A| = 0$$

$$\begin{bmatrix} 1 & 3 \\ 2 & 9 \end{bmatrix}$$

(v)
$$\begin{bmatrix} 1 & 3 \\ 2 & 8 \end{bmatrix}$$
$$A = \begin{bmatrix} 1 & 3 \\ 2 & 8 \end{bmatrix}$$

يس

چونکه 0= |A|اس لیے ا-A ممکن نہیں۔

A-I A =I ثابت کرنے کے لیے







$$|A| = \begin{vmatrix} 1 & 3 \\ 2 & 8 \end{vmatrix}$$

$$\Rightarrow |A| = 1 \times 8 - 3 \times 2$$

$$= 8 - 6$$

$$= 2$$

$$Adj (A) = \begin{bmatrix} 8 & -3 \\ -2 & 1 \end{bmatrix}$$

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

$$\begin{cases} A^{-1} = \frac{Adj(A)}{|A|} \\ A^{-1} = \frac{A}{|A|} \end{cases}$$

A-1A=I ثابت کرنے کے لیے

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

$$A^{-1} = \frac{\begin{bmatrix} 8 & -3 \\ -2 & 1 \end{bmatrix}}{2}$$

$$= \frac{1}{2} \begin{bmatrix} 8 & -3 \\ 2 & 1 \end{bmatrix}$$

$$A^{-1} = \frac{1}{2} \begin{bmatrix} 8 & -3 \\ -2 & 1 \end{bmatrix}$$
$$A^{-1} = \begin{bmatrix} \frac{8}{2} & \frac{-3}{2} \\ 2 & 1 \end{bmatrix}$$

$$A^{-1} = \begin{bmatrix} \frac{8}{2} & \frac{-3}{2} \\ -\frac{2}{2} & \frac{1}{2} \end{bmatrix}$$

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

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

$$A^{-1} = \begin{bmatrix} 4 & -\frac{3}{2} \\ -1 & \frac{1}{2} \end{bmatrix}$$

$$A^{-1} = \begin{bmatrix} -\frac{2}{2} & \frac{1}{2} \\ 4 & -\frac{3}{2} \\ -1 & \frac{1}{2} \end{bmatrix}$$

$$\begin{bmatrix} 4 & -\frac{3}{2} \\ \end{bmatrix}_{[-1, \frac{3}{2}]}$$

$$A^{-1} = \begin{bmatrix} -\frac{2}{2} & \frac{1}{2} \\ 4 & -\frac{3}{2} \\ -1 & \frac{1}{2} \end{bmatrix}$$

$$\begin{bmatrix} 4 & -\frac{3}{2} \end{bmatrix}_{5}$$

$$A^{-1} = \begin{bmatrix} 2 & 2 \\ 4 & -\frac{3}{2} \\ -1 & \frac{1}{2} \end{bmatrix}$$

$$A^{-1}A = \begin{bmatrix} 4 & -\frac{3}{2} \\ 1 & 3 \end{bmatrix}$$

$$A^{-1} = \begin{bmatrix} 4 & -\frac{1}{2} \\ -1 & \frac{1}{2} \end{bmatrix}$$

$$A^{-1}A = \begin{bmatrix} 4 & -\frac{3}{2} \\ -1 & \frac{1}{2} \end{bmatrix} \begin{bmatrix} 1 & 3 \\ 2 & 8 \end{bmatrix}$$

$$A^{-1}A = \begin{bmatrix} 4 & -\frac{3}{2} \\ -1 & \frac{1}{2} \end{bmatrix} \begin{bmatrix} 1 & 3 \\ 2 & 8 \end{bmatrix}$$

$$A^{-1}A = \begin{bmatrix} 4 & -\frac{3}{2} \\ -1 & \frac{1}{2} \end{bmatrix} \begin{bmatrix} 1 & 3 \\ 2 & 8 \end{bmatrix}$$
$$= \begin{bmatrix} 4(1) + \left(-\frac{3}{2}\right)2 & 4(3) + \left(-\frac{3}{2}\right)8 \\ (-1)(1) + \frac{1}{2}(2) & -1(3) + \frac{1}{2}(8) \end{bmatrix}$$

$$A^{-1} = \begin{bmatrix} 4 & -\frac{3}{2} \\ -1 & \frac{1}{2} \end{bmatrix}$$

$$\begin{bmatrix} -1 \\ A^{-1}A = \begin{bmatrix} 4 \\ 1 \end{bmatrix}$$

$$A^{-1}A = \begin{bmatrix} 4 & -\frac{3}{2} \\ -1 & \frac{1}{2} \end{bmatrix} \begin{bmatrix} 2 & 1 \\ 1 & 1 \end{bmatrix}$$

$$\mathbf{A}^{-1}\mathbf{A} = \begin{bmatrix} 4 & -\frac{3}{2} \\ -1 & \frac{1}{2} \end{bmatrix}$$

$$A^{-1}A = \begin{bmatrix} 4 \\ -1 \end{bmatrix}$$

$$\mathbf{A}^{-1}\mathbf{A} = \begin{bmatrix} 2 \\ -1 \end{bmatrix}$$



$$A^{-1}A = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} = \mathbf{I}$$

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

(vi)
$$\begin{bmatrix} -1 & 0 \\ 0 & -1 \end{bmatrix}$$
$$A = \begin{bmatrix} -1 & 0 \\ 0 & -1 \end{bmatrix}$$
$$\Rightarrow |A| = \begin{vmatrix} -1 & 0 \\ 0 & -1 \end{vmatrix}$$

$$\begin{vmatrix}
0 & -1 \\
-1 & 0 \\
0 & -1 \\
= (-1)(-1) - 0 \\
|A| = 1
\end{vmatrix}$$

$$Adj(A) = \begin{bmatrix} -1 & 0 \\ 0 & -1 \end{bmatrix}$$

$$Adj(A)$$

$$Adj(A) = \begin{bmatrix} 0 & -1 \end{bmatrix}$$

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

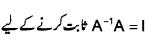
$$A^{-1} = \frac{\begin{bmatrix} -1 & 0\\ 0 & -1 \end{bmatrix}}{1}$$
$$A^{-1} = \begin{bmatrix} -1 & 0\\ 0 & -1 \end{bmatrix}$$

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

$$A^{-1}A = \begin{bmatrix} -1 & 0 \\ 0 & -1 \end{bmatrix} \begin{bmatrix} -1 & 0 \\ 0 & -1 \end{bmatrix}$$
$$= \begin{bmatrix} (-1)(-1) + 0 & 0 + 0 \\ 0(-1) + (-1)(0) & 0 + (-1)(-1) \end{bmatrix}$$
$$A^{-1}A = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} = I$$

(vii)
$$\begin{bmatrix} \frac{3}{5} & \frac{-4}{5} \\ \frac{4}{5} & \frac{3}{5} \end{bmatrix}$$

جونکه 0 ≠ A | اس ليے ا- A ممکن ہے۔



حل: فرض كيا

$$A = \begin{bmatrix} \frac{3}{5} & \frac{-4}{5} \\ \frac{4}{5} & \frac{3}{5} \end{bmatrix}$$
$$|A| = \begin{vmatrix} \frac{3}{5} & -\frac{4}{5} \\ \frac{4}{5} & \frac{3}{5} \end{vmatrix}$$

$$A = \begin{bmatrix} \frac{4}{5} \\ \frac{1}{5} \end{bmatrix}$$

$$|A| = \begin{vmatrix} \frac{3}{5} \\ \frac{4}{5} \end{vmatrix}$$

$$\begin{vmatrix} \frac{4}{5} \\ |A| = \begin{vmatrix} \frac{3}{5} \\ \frac{4}{5} \end{vmatrix}$$

$$\Rightarrow |A| = \begin{vmatrix} \frac{1}{5} & \frac{3}{5} \\ \frac{3}{5} & \frac{-4}{5} \\ \frac{4}{5} & \frac{3}{5} \end{vmatrix}$$

$$= \left(\frac{3}{5}\right)\left(\frac{3}{5}\right) - \left(\frac{-4}{5}\right)\left(\frac{4}{5}\right)$$

$$= \frac{9}{25} + \frac{16}{25}$$
$$|A| = \frac{25}{25} = 1$$

Adj (A) =
$$\begin{bmatrix} 3/& 4/5\\ /5& /5\\ -4/& 3/5 \end{bmatrix}$$

$$A^{-1}$$

$$A^{-1} = \begin{bmatrix} 3/5 & 4/5 \\ -4/5 & 3/5 \end{bmatrix}$$

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

$$\begin{bmatrix} 3/5 & 4/5 \\ 5/5 & 5/5 \\ -4/ & 3/ \end{bmatrix} \begin{bmatrix} 3/5 & -4/5 \\ 4/ & 3/ \end{bmatrix}$$

$$A^{-1}A = \begin{bmatrix} 3/ & 4/5 \\ /5 & /5 \\ -4/5 & 3/5 \end{bmatrix} \begin{bmatrix} 3/5 & -4/5 \\ 4/5 & 3/5 \end{bmatrix}$$

$$= \begin{bmatrix} \left(\frac{3}{5}\right)\left(\frac{3}{5}\right) + \left(\frac{4}{5}\right)\left(\frac{4}{5}\right) & \left(\frac{3}{5}\right)\left(\frac{-4}{5}\right) + \left(\frac{4}{5}\right)\left(\frac{3}{5}\right) \\ \left(-\frac{4}{5}\right)\left(\frac{3}{5}\right) + \left(\frac{3}{5}\right)\left(\frac{4}{5}\right) & \left(\frac{-4}{5}\right)\left(\frac{-4}{5}\right) + \left(\frac{3}{5}\right)\left(\frac{3}{5}\right) \end{bmatrix}$$

$$= \begin{bmatrix} \frac{9}{25} + \frac{16}{25} & \frac{-12}{25} + \frac{12}{25} \\ \frac{-12}{25} + \frac{12}{25} & \frac{16}{25} + \frac{9}{25} \end{bmatrix} = \begin{bmatrix} \frac{9+16}{25} & \frac{-12+12}{25} \\ \frac{-12+12}{25} & \frac{16+9}{25} \end{bmatrix} = \begin{bmatrix} \frac{25}{25} & 0 \\ 0 & \frac{25}{25} \end{bmatrix}$$

چونکہ A ≠ A | اس لیے ⁻ A ممکن ہے۔

A-1A = I ٹابت کرنے کے لیے

$$\mathbf{A}^{-1}\mathbf{A} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} = \mathbf{I}$$

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

$$M = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$$
 4 معلوم کیجے۔ M^{-1} (a)

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

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

$$\Rightarrow |M| = \begin{vmatrix} 1 & 2 \\ 3 & 4 \end{vmatrix}$$
$$= 4 - 6$$

 $L.H.S = M^{-1}M$

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

$$M^{-1} = \frac{Adj(M)}{|M|}$$

 $\mathbf{M}^{-1} = \begin{bmatrix} \frac{-4}{2} & \frac{-2}{2} \\ \frac{-3}{2} & \frac{-1}{2} \end{bmatrix} = \begin{bmatrix} -2 & 1 \\ \frac{3}{2} & \frac{-1}{2} \end{bmatrix}$

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

$$Adj(M) = \begin{bmatrix} 4 & -2 \\ -3 & 1 \end{bmatrix}$$

$$M^{-1} \quad Adj(M)$$

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

$$di(M)$$

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

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

 $= \begin{bmatrix} (-2)(1)+(1)(3) & (-2)(2)+(1)(4) \\ \left(\frac{3}{2}\right)(1)+\left(\frac{-1}{2}\right)(3) & \left(\frac{3}{2}\right)(2)+\left(\frac{-1}{2}\right)(4) \end{bmatrix} = \begin{bmatrix} -2+3 & -4+4 \\ \frac{3}{2}-\frac{3}{2} & 3-2 \end{bmatrix}$

 $M^{-1}M = MM^{-1}$ d

پس M-1 ممکن ہے۔

 $M^{-1} M = M M^{-1}$ (b)

$$L.H.S = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \dots (i)$$

$$L.H.S = \begin{bmatrix} 0 & 1 \end{bmatrix} \dots ($$

R.H.S= MM⁻¹

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

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

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

$$= \left[(3)(-2) + (4)(\frac{3}{2}) \quad (3)(1) + (4)(\frac{-1}{2}) \right] \quad \begin{bmatrix} -6+6 & 3-2 \end{bmatrix}$$

$$\therefore \quad \text{R.H.S} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \qquad \qquad \dots \dots \text{(ii)}$$

$$\mathbf{M}^{-1}\,\mathbf{M}=\mathbf{M}\mathbf{M}^{-1}$$

$$M = MM^{-1}$$

$$A = \begin{bmatrix} 5 & 2 \\ 2 & 1 \end{bmatrix}$$

$$\Rightarrow |A| = \begin{vmatrix} 5 & 2 \\ 2 & 1 \end{vmatrix}$$

$$A = \begin{vmatrix} 3 \\ 2 \end{vmatrix}$$

$$|A| = 5 - 4 = 1$$

$$=5-4=1$$

$$|=5-4=1$$

$$|z|^{2}$$
 $|z|$ $|z| = 5 - 4 = 1$

$$|=5-4=1$$

$$\operatorname{di}(A) = \begin{bmatrix} 1 \\ 2 \end{bmatrix}$$

$$= 5 - 4 = 1$$

$$= 1$$

$$|A| = 5 - 4 = 1$$
Adj $(A) = \begin{bmatrix} 1 & -2 \\ -2 & 5 \end{bmatrix}$

$$= 5 - 4 = 1$$

$$i(A) = \begin{bmatrix} 1 \\ 2 \end{bmatrix}$$

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

 $A^{-1} = \begin{bmatrix} 1 & -2 \\ -2 & 5 \end{bmatrix}$

 $\therefore A^{-1} = \begin{bmatrix} 1 & -2 \\ -2 & 5 \end{bmatrix}$

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

$$|2 \ 1|$$

= 5 - 4 = 1

$$= \begin{bmatrix} (1)(-2) + (2)\frac{3}{2} \\ (3)(-2) + (4)(\frac{3}{2}) \end{bmatrix}$$

$$\begin{bmatrix} 3 \\ (1) \end{bmatrix}$$

$$S = MM^{-1}$$

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

$$L.H.S = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \dots (i)$$

$$(AB)^{-1} = B^{-1}A^{-1} \implies B = \begin{bmatrix} 4 & 2 \\ 3 & -1 \end{bmatrix}, A = \begin{bmatrix} 5 & 2 \\ 2 & 1 \end{bmatrix} -5$$

$$: 0$$

پس A-1 ممکن ہے۔

$$\Rightarrow |B| = \begin{vmatrix} 4 & 2 \\ 3 & -1 \end{vmatrix}$$

$$= -4 - -10$$

$$B^{-1} = \frac{Adj(B)}{|B|}$$

$$B^{-1} = \frac{\begin{bmatrix} -1 \\ -3 \end{bmatrix}}{-10}$$

$$B^{-1} = \frac{Adj(B)}{|B|}$$

پس'B' ممکن ہے۔

اب ہم 1- B-1 A معلوم کرتے ہیں۔

ای طرح

$$B^{-1} = \frac{\begin{bmatrix} -1 & -2 \\ -3 & 4 \end{bmatrix}}{-10} = \frac{-1}{10} \begin{bmatrix} -1 & -2 \\ -3 & 4 \end{bmatrix}$$

$$\therefore \quad \mathbf{B}^{-1} = \begin{bmatrix} \frac{1}{10} & \frac{1}{5} \\ \frac{3}{10} & \frac{-2}{5} \end{bmatrix}$$

$$B^{-1}A^{-1} = \begin{bmatrix} \frac{1}{10} & \frac{1}{5} \\ \frac{3}{10} & \frac{-2}{5} \end{bmatrix} \begin{bmatrix} 1 & -2 \\ -2 & 5 \end{bmatrix}$$

 $= \begin{vmatrix} (\frac{1}{10})(1) + (\frac{1}{5})(-2) & (\frac{1}{10})(-2) + (\frac{1}{5})(5) \\ (\frac{3}{10})(1) + (\frac{-2}{5})(-2) & (\frac{3}{10})(-2) + (\frac{-2}{5})(5) \end{vmatrix}$

(i)

 $= \begin{vmatrix} \frac{1}{10} - \frac{2}{5} & \frac{-1}{5} + 1 \\ \frac{3}{10} + \frac{4}{5} & \frac{-3}{5} - 2 \end{vmatrix} = \begin{vmatrix} \frac{1-4}{10} & \frac{-1+5}{5} \\ \frac{3+8}{10} & \frac{-3-10}{5} \end{vmatrix}$

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

 $B^{-1}A^{-1} = \begin{vmatrix} \frac{-3}{10} & \frac{4}{5} \\ \frac{11}{10} & \frac{-13}{5} \end{vmatrix}$

 $AB = \begin{vmatrix} 5 & 2 & 4 & 2 \\ 2 & 1 & 3 & -1 \end{vmatrix}$

 $(AB) = \begin{bmatrix} 20+6 & 10-2 \\ 8+3 & 4-1 \end{bmatrix} = \begin{bmatrix} 26 & 8 \\ 11 & 3 \end{bmatrix}$

$$|AB| = \begin{vmatrix} 26 & 8 \\ 11 & 3 \end{vmatrix}$$

$$= (26)(3)$$
 $|AB| = 78 - 88$

$$= (26) (3) - (8) (11)$$
$$|AB| = 78 - 88 = -10$$

$$= (26) (3) - (8) (11)$$

$$|AB| = 78 - 88 = -10$$

$$\begin{bmatrix} 3 & -8 \end{bmatrix}$$

 $(AB)^{-1} = \frac{\begin{bmatrix} 3 & -8 \\ -11 & 26 \end{bmatrix}}{-10}$

$$= (26) (3) - (8) (11)$$

$$|AB| = 78 - 88 = -10$$

$$\begin{bmatrix} 3 & -8 \end{bmatrix}$$

= (26) (3) - (8) (11)

$$|AB| = 78 - 88 = -10$$

Adj (AB) = $\begin{bmatrix} 3 & -8 \\ -11 & 26 \end{bmatrix}$

$$= (26) (3) - (8) (11)$$

$$|AB| = 78 - 88 = -10$$

$$\begin{bmatrix} 3 & -8 \end{bmatrix}$$

$$= (26) (3) - (8) (11)$$

$$|AB| = 78 - 88 = -10$$

$$\boxed{3 - 8}$$

$$= (26) (3) - (8) (11)$$

$$AB| = 78 - 88 = -10$$

$$\begin{bmatrix} 3 & -8 \end{bmatrix}$$

$$= (26) (3) - (8) (11)$$

$$|AB| = 78 - 88 = -10$$

$$|AB| = 3 - 8$$

$$= (26) (3) - (8) (11)$$

$$AB| = 78 - 88 = -10$$

$$\begin{bmatrix} 3 & -8 \end{bmatrix}$$

$$= (26) (3) - (8) (11)$$

$$AB| = 78 - 88 = -10$$

$$\begin{bmatrix} 3 & -8 \end{bmatrix}$$

$$= (26) (3) - (8) (11)$$

$$AB = 78 - 88 = -10$$

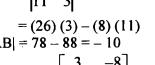
$$\begin{bmatrix} 3 & -8 \end{bmatrix}$$

 $(AB)^{-1} = B^{-1}A^{-1}$

$$= (26) (3) - (8) (11)$$

$$AB = 78 - 88 = -10$$

$$\begin{bmatrix} 3 & -8 \end{bmatrix}$$



$$= (26) (3) - (8) (11)$$

$$B| = 78 - 88 = -10$$

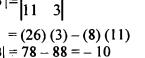
$$\begin{bmatrix} 3 & -8 \end{bmatrix}$$

$$= (26) (3) - (8) (11)$$

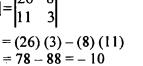
$$= (78 - 88) = -10$$

$$3 = |11 3|$$

= (26) (3) - (8) (11)
 $3 = 78 - 88 = -10$



$$\begin{aligned} 3 &| = \begin{vmatrix} 25 & 3 \\ 11 & 3 \end{vmatrix} \\ &= (26)(3) - (8)(11) \\ &| = 78 - 88 = -10 \end{aligned}$$



$$5|=|11 3|$$

$$= (26)(3) - (8)(11)$$

$$5|= 78 - 88 = -10$$

$$\begin{vmatrix} = 26 & 3 \\ 11 & 3 \end{vmatrix}$$

$$= (26)(3) - (8)(11)$$

$$= 78 - 88 = -10$$

$$\begin{vmatrix} = 1 & 3 \\ 11 & 3 \end{vmatrix}$$
= (26) (3) - (8) (11)
$$\begin{vmatrix} = 78 - 88 = -10 \end{vmatrix}$$

$$\begin{vmatrix} = 26 & 8 \\ 11 & 3 \end{vmatrix}$$

$$= (26)(3) - (8)(11)$$

$$= 78 & 88 = 10$$

$$= \begin{vmatrix} 26 & 8 \\ 11 & 3 \end{vmatrix}$$

$$= (26)(3) - (8)(11)$$

$$= 78 & 88 = 10$$

$$\begin{vmatrix}
| = \begin{vmatrix} 26 & 8 \\ 11 & 3 \end{vmatrix} \\
= (26)(3) - (8)(11) \\
= 78 - 88 = -10$$

 $= \begin{bmatrix} \frac{-3}{10} & \frac{8}{10} \\ \frac{11}{10} & \frac{-26}{10} \end{bmatrix} = \begin{bmatrix} \frac{-3}{10} & \frac{4}{5} \\ \frac{11}{10} & \frac{-13}{5} \end{bmatrix}$

(ii)

پس،(i)اور (ii) سے ٹابت ہوا کہ