

3. ALGEBRA OF MATRICES

PREVIOUS EAMCET BITS

1. If one roots of $\begin{vmatrix} 3 & 5 & x \\ 7 & x & 7 \\ x & 5 & 3 \end{vmatrix} = 0$ is -10 , then the other roots are [EAMCET 2009]

- 1) 3, 7 2) 4, 7 3) 3, 9 4) 3, 4

Ans: 1

Sol: $3(3x - 35) - 5(21 - 7x) + x(35 - x^2) = 0$

$\Rightarrow x^3 - 79x + 210 = 0$

Verify $S_1 ; S_1 = 0$

$-10 + \alpha + \beta = 0$

$\alpha + \beta = 10$

\therefore Roots are 3, 7

2. If x, y, z are all positive and are the $p^{\text{th}}, q^{\text{th}}$ and r^{th} terms of a geometric progression respectively,

then the value of the determinant $\begin{vmatrix} \log x & p & 1 \\ \log y & q & 1 \\ \log z & r & 1 \end{vmatrix} =$ [EAMCET 2009]

- 1) $\log(xyz)$ 2) $(p-1)(p-1)(r-1)$ 3) pqr 4) 0

Ans: 4

Sol: Let $x = AR^{p-1}, y = AR^{q-1}, z = AR^{r-1}$

$\therefore \text{Log}x = \text{Log}A + (p-1)\text{Log}R$

$\text{Log}y = \text{Log}A + (q-1)\text{Log}R$

$\text{Log}z = \text{Log}A + (r-1)\text{Log}R$

$\begin{vmatrix} \log A + (p-1)\log R & p & 1 \\ \log A + (q-1)\log R & q & 1 \\ \log A + (r-1)\log R & r & 1 \end{vmatrix} = 0$

3. If $\begin{vmatrix} 1 & -1 & x \\ 1 & x & 1 \\ x & -1 & 1 \end{vmatrix}$ has no inverse, then the real value of x is [EAMCET 2009]

- 1) 2 2) 3 3) 0 4) 1

Ans: 4

Sol: $\text{Det } A = 0 \Rightarrow x = 1$

4. If $A = \begin{bmatrix} 1 & -2 \\ 4 & 5 \end{bmatrix}$ and $f(t) = t^2 - 3t + 7$ then $f(A) + \begin{bmatrix} 3 & 6 \\ -12 & -9 \end{bmatrix} =$ [EAMCET 2008]

1) $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ 2) $\begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$ 3) $\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$ 4) $\begin{bmatrix} 1 & 1 \\ 0 & 0 \end{bmatrix}$

Ans: 2

Sol: $A^2 = \begin{bmatrix} 1 & -2 \\ 4 & 5 \end{bmatrix} \begin{bmatrix} 1 & -2 \\ 4 & 5 \end{bmatrix} = \begin{bmatrix} -7 & -12 \\ 24 & 17 \end{bmatrix}$

$$f(A) = \begin{bmatrix} 3 & 6 \\ -12 & -9 \end{bmatrix} = A^2 - 3A + 7I + \begin{bmatrix} 3 & 6 \\ -12 & -9 \end{bmatrix}$$

$$= \begin{bmatrix} -7 & -12 \\ 24 & 17 \end{bmatrix} - 3 \begin{bmatrix} 1 & -2 \\ 4 & 5 \end{bmatrix} + 7 \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} + \begin{bmatrix} 3 & 6 \\ -12 & -9 \end{bmatrix} = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$$

5. The inverse of the matrix $\begin{bmatrix} 7 & -3 & 3 \\ -1 & 1 & 0 \\ -1 & 0 & 1 \end{bmatrix}$ [EAMCET 2008]

1) $\begin{bmatrix} 1 & 1 & 1 \\ 3 & 4 & 3 \\ 3 & 3 & 4 \end{bmatrix}$ 2) $\begin{bmatrix} 1 & 3 & 1 \\ 4 & 3 & 8 \\ 3 & 4 & 1 \end{bmatrix}$ 3) $\begin{bmatrix} 1 & 1 & 1 \\ 3 & 3 & 4 \\ 3 & 4 & 3 \end{bmatrix}$ 4) $\begin{bmatrix} 1 & 3 & 3 \\ 1 & 4 & 3 \\ 1 & 3 & 4 \end{bmatrix}$

Ans:

Sol: $AA^{-1} = I$

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

6. $\begin{vmatrix} a-b-c & 2a & 2a \\ 2b & b-c-a & 2b \\ 2c & 2c & c-a-b \end{vmatrix} =$ [EAMCET 2008]

1) 0 2) $a + b + c$ 3) $(a + b + c)^2$ 4) $(a + b + c)^3$

Ans: 4

Sol: Put $a = 1, b = 1, c = 1$

$$\begin{vmatrix} -1 & 2 & 2 \\ 2 & -1 & 2 \\ 2 & 2 & -1 \end{vmatrix} = -1(-3) - 2(-6) + 2(6) = 27$$

$$(a + b + c)^3 = (1 + 1 + 1)^3 = 27$$

7. If $\begin{bmatrix} 1 & 2 & x \\ 4 & -1 & 7 \\ 2 & 4 & -6 \end{bmatrix}$ is a singular matrix, then $x =$ [EAMCET 2007]

1) 0 2) 1 3) -3 4) 3

Ans: 3

Sol: $\det A = 0$

$$1(6-28) - 2(-24-14) + x(16+2) = 0$$

$$-22 + 76 + 18x = 0$$

$$\Rightarrow x = -3$$

8. If A is a square matrix such that $A(\text{Adj } A) = \begin{pmatrix} 4 & 0 & 0 \\ 0 & 4 & 0 \\ 0 & 0 & 4 \end{pmatrix}$ then $\det(\text{Adj } A) =$ [EAMCET 2007]

1) 4

2) 16

3) 64

4) 256

Ans: 2

Sol: $A(\text{Adj } A) = |A|I$

$$\begin{pmatrix} 4 & 0 & 0 \\ 0 & 4 & 0 \\ 0 & 0 & 4 \end{pmatrix} = \begin{pmatrix} |A| & 0 & 0 \\ 0 & |A| & 0 \\ 0 & 0 & |A| \end{pmatrix}$$

$$|A| = 4$$

$$\det(\text{Adj } A) = (\det A)^{n-1}$$

$$= (4)^{3-1}$$

$$= 16$$

9. The number of nontrivial solutions of the system $x - y + z = 0, x + 2y - z = 0, 2x + y + 3z = 0$ is

[EAMCET 2007]

1) 0

2) 1

3) 2

4) 3

Ans: 1

Sol: Write given system of equation in matrix form $AX = B \Rightarrow \begin{bmatrix} 1 & -1 & 1 \\ 1 & 2 & -1 \\ 2 & 1 & 3 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix}$

Now $|A| = \begin{vmatrix} 1 & -1 & 1 \\ 1 & 2 & -1 \\ 2 & 1 & 3 \end{vmatrix} = 9$

Since $|A| \neq 0$. So given system of equation has only trivial solution, so there is no non-trivial solution.

10. $A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$ then $A^3 - 4A^2 - 6A$ is equal to [EAMCET 2006]

1) 0

2) A

3) -A

4) I

Ans: 3

Sol: $A^2 = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix} \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix} = \begin{bmatrix} 9 & 8 & 8 \\ 8 & 9 & 8 \\ 8 & 8 & 9 \end{bmatrix}$

$$A^3 A^2 \cdot A = \begin{bmatrix} 9 & 8 & 8 \\ 8 & 9 & 8 \\ 8 & 8 & 9 \end{bmatrix} \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix} = \begin{bmatrix} 41 & 42 & 42 \\ 42 & 41 & 42 \\ 42 & 42 & 41 \end{bmatrix}$$

$$A^3 - 4A^2 - 6A = \begin{bmatrix} 41 & 42 & 42 \\ 42 & 41 & 42 \\ 42 & 42 & 41 \end{bmatrix} - 4 \begin{bmatrix} 9 & 8 & 8 \\ 8 & 9 & 8 \\ 8 & 8 & 9 \end{bmatrix} - 6 \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$$

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

11. $\begin{vmatrix} \log e & \log e^2 & \log e^3 \\ \log e^2 & \log e^3 & \log e^4 \\ \log e^3 & \log e^4 & \log e^5 \end{vmatrix} =$ [EAMCET 2006]

- 1) 0 2) 1 3) 4 log e 4) 5 log e

Ans: 1

Sol: $\begin{vmatrix} \log e & 2\log e & 3\log e \\ 2\log e & 3\log e & 4\log e \\ 3\log e & 4\log e & 5\log e \end{vmatrix} = \begin{vmatrix} 1 & 2 & 3 \\ 2 & 3 & 4 \\ 3 & 4 & 5 \end{vmatrix}$

$C_2 - C_1$ and $C_3 - C_2$

$$= \begin{vmatrix} 1 & 1 & 1 \\ 2 & 1 & 1 \\ 3 & 1 & 1 \end{vmatrix} = 0$$

12. If A is an invertible matrix of order n, then the determinant of adjA is equal to [EAMCET 2006]

- 1) $|A|^n$ 2) $|A|^{n+1}$ 3) $|A|^{n-1}$ 4) $|A|^{n+2}$

Ans: 3

Sol: Since A is invertible matrix of order n, then the determinant of adjA = $|A|^{n-1}$

13. $m[-3 \ 4] + n[4 \ -3] = [10 \ -11] \Rightarrow 3m + 7n =$ [EAMCET 2005]

- 1) 3 2) 5 3) 10 4) 1

Ans: 1

Sol: $-3m + 4n = 10 \dots\dots\dots(1)$

$4m - 3n = -11 \dots\dots\dots(2)$

Solve (1) & (2) we get

$m = -2, n = 1$

$\therefore 3m + 7n = -6 + 7 = 1$

14. $\text{Adj} \begin{bmatrix} 1 & 0 & 2 \\ -1 & 1 & -2 \\ 0 & 2 & 1 \end{bmatrix} = \begin{bmatrix} 5 & a & -2 \\ 1 & 1 & 0 \\ -2 & -2 & b \end{bmatrix} \Rightarrow [a \ b] =$ [EAMCET 2005]

- 1) $[-4 \ 1]$ 2) $[-4 \ -1]$ 3) $[4 \ 1]$ 4) $[4 \ -1]$

Ans: 3

Sol: Give that $\text{adj} \begin{bmatrix} 1 & 0 & 2 \\ -1 & 1 & -2 \\ 0 & 2 & 1 \end{bmatrix} = \begin{bmatrix} 5 & a & -2 \\ 1 & 1 & 0 \\ -2 & -2 & b \end{bmatrix}$

Cofactors of $\begin{bmatrix} 1 & 0 & 2 \\ -1 & 1 & -2 \\ 0 & 2 & 1 \end{bmatrix} = \begin{bmatrix} 5 & 1 & -2 \\ 4 & 1 & -2 \\ -2 & 0 & 1 \end{bmatrix}$

$\text{Adj} \begin{bmatrix} 1 & 0 & 2 \\ -1 & 0 & -2 \\ 0 & 2 & 1 \end{bmatrix} = \begin{bmatrix} 5 & 4 & -2 \\ 1 & 1 & 0 \\ -2 & -2 & 1 \end{bmatrix} = \begin{bmatrix} 5 & a & -2 \\ 1 & 1 & 0 \\ -2 & -2 & b \end{bmatrix}$

$\Rightarrow a = 4, b = 1$

$[a \ b] = [4 \ 1]$

15. $A = \begin{bmatrix} -1 & 0 \\ 0 & 2 \end{bmatrix} \Rightarrow A^3 - A^2 =$ [EAMCET 2005]

- 1) $2A$ 2) $2I$ 3) A 4) I

Ans: 1

Sol: $A^2 = \begin{bmatrix} -1 & 0 \\ 0 & 2 \end{bmatrix} \begin{bmatrix} -1 & 0 \\ 0 & 2 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 4 \end{bmatrix}$

$A^3 = \begin{bmatrix} 1 & 0 \\ 0 & 4 \end{bmatrix} \begin{bmatrix} -1 & 0 \\ 0 & 2 \end{bmatrix} = \begin{bmatrix} -1 & 0 \\ 0 & 8 \end{bmatrix}$

$A^3 - A^2 = \begin{bmatrix} -2 & 0 \\ 0 & 4 \end{bmatrix} = 2A$

16. Match the following elements of $\begin{bmatrix} 1 & -1 & 0 \\ 0 & 4 & 2 \\ 3 & -4 & 6 \end{bmatrix}$ with their cofactors and choose the correct answer [EAMCET 2004]

Element

Cofactor

I) -1

a) -2

II) 1

b) 32

III) 3

c) 4

IV) 6

d) 6

e) -6

1) b, d, a, c

2) b, d, c, a

3) d, b, a, c

4) d, a, b, c

Ans: 3

Sol: Cofactor of $-1 = (-1)^{1+2} \begin{vmatrix} 0 & 2 \\ 3 & 6 \end{vmatrix} = +6$

Cofactor of $1 = (-1)^{1+1} \begin{vmatrix} 4 & 2 \\ -4 & 6 \end{vmatrix} = 32$

Cofactor of $3 = (-1)^{3+1} \begin{vmatrix} -1 & 0 \\ 4 & 2 \end{vmatrix} = -2$

Cofactor of $6 = (-1)^{3+3} \begin{vmatrix} 1 & -1 \\ 0 & 4 \end{vmatrix} = 4$

17. $\det \begin{bmatrix} 1990 & 1991 & 1992 \\ 1991 & 1992 & 1993 \\ 1992 & 1993 & 1994 \end{bmatrix} =$ [EAMCET 2004]

- 1) 1992 2) 1993 3) 1994 4) 0

Ans: 4

Sol: $C_2 - C_1$ and $C_3 - C_2$

$$\begin{vmatrix} 1990 & 1 & 1 \\ 1991 & 1 & 1 \\ 1992 & 1 & 1 \end{vmatrix} = 0$$

18. The rank of $\begin{bmatrix} 1 & -1 & 1 \\ 1 & 1 & -1 \\ -1 & 1 & 1 \end{bmatrix}$ is [EAMCET 2004]

- 1) 0 2) 1 3) 2 4) 3

Ans: 4

Sol: $\det A = 1(1+1) + 1(1-1) + 1(1+1)$
 $= 4$

$\det A \neq 0$

\therefore Rank of $A = 3$

19. If $p + q + r = 0$ and $\begin{vmatrix} pa & qb & rc \\ qc & ra & pb \\ rb & pc & qa \end{vmatrix} = k \begin{vmatrix} a & b & c \\ c & a & b \\ b & c & a \end{vmatrix}$ then $k =$ [EAMCET 2003]

- 1) 0 2) abc 3) pqr 4) $a + b + c$

Ans: 3

Sol: Put $p = 1, q = 1, r = -2, a = 1, b = 1, c = 2$

$$\begin{vmatrix} 1 & 1 & -4 \\ 2 & -2 & +1 \\ -2 & 2 & 1 \end{vmatrix} = K \begin{vmatrix} 1 & 1 & 2 \\ 2 & 1 & 1 \\ 1 & 2 & 1 \end{vmatrix}$$

$$\Rightarrow -8 = K(4) \Rightarrow K = -2$$

$$\therefore K = pqr$$

20. If $\begin{vmatrix} \cos(A+B) & -\sin(A+B) & \cos 2B \\ \sin A & \cos A & \sin B \\ -\cos A & \sin A & \cos B \end{vmatrix} = 0$ then B = [EAMCET 2003]

- 1) $(2n+1)\frac{\pi}{2}$ 2) $n\pi$ 3) $(2n+1)\pi$ 4) $2n\pi$

Ans: 1

Sol: $\cos^2(A+B) + \sin^2(A+B) + \cos 2B = 0$

$$1 + \cos 2B = 0$$

$$2\cos^2 B = 0$$

$$\cos B = 0 \Rightarrow B = (2n+1)\frac{\pi}{2}, n \in \mathbb{Z}$$

21. The number of solutions of the system equations $2x + y - z = 7, x - 3y + 3z = 1, x + 4y - 3z = 5$ is
 1) 3 2) 2 3) 1 4) 0 [EAMCET 2003]

Ans: 3

Sol: Given $2x + y - z = 7$ (1)

$$x - 3y + 2z = 1$$
(2)

$$x + 4y - 3z = 5$$
(3)

From (1) & (2) we get

$$5x - y = 15$$
(4)

From (1) & (3) we get

$$5x - y = 16$$
(5)

(4) & (5) are parallel

\therefore solution does not exist.

22. If A, B are square matrices of order 3, A is non-singular and $AB = 0$, then B is a [EAMCET 2002]

- 1) Null matrix 2) Non-singular matrix
 3) Singular matrix 4) Unit matrix

Ans: 1 and 3

Sol: Given $AB = 0$

$$\Rightarrow B = 0 \text{ [}\because \text{A is non-singular]} \text{ (or)}$$

$$|AB| = 0$$

$$|A||B| = 0 \Rightarrow |B| = 0 \text{ [}\because \text{A is non-singular } |A| \neq 0 \text{]}$$

\therefore B is null matrix (or) singular matrix

23. If $A = \begin{bmatrix} 1 & 0 & 1 \\ 2 & 1 & 0 \\ 3 & 2 & 1 \end{bmatrix}$ then, $\det A =$ [EAMCET 2002]

- 1) 2 2) 3 3) 4 4) 5

Ans: 1

Sol: $\det A = 1(1-0) + 1(4-3)$
 $= 2$

24. If $x^2 + y^2 + z^2 \neq 0$, $x = cy + bz$, $y = ax + cz$ and $z = bx + ay$, then $a^2 + b^2 + c^2 + 2abc =$ [EAMCET 2002]

- 1) 2 2) $a + b + c$ 3) 1 4) $ab + bc + ca$

Ans: 3

Sol: Given $x - cy - bz = 0$

$$cx - y + az = 0$$

$$bx + ay - z = 0$$

$$\Rightarrow \begin{vmatrix} 1 & -c & -b \\ c & -1 & a \\ b & a & -1 \end{vmatrix} = 0$$

$$\Rightarrow 1(1 - a^2) + c(-c - ab) - b(ac + b) = 0$$

$$\therefore a^2 + b^2 + c^2 + 2abc = 1$$

25. If $A = \begin{bmatrix} 2 & 2 \\ -3 & 2 \end{bmatrix}$, $B = \begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix}$, then $(B^{-1}A^{-1})^{-1} =$ [EAMCET 2001]

- 1) 2) 3) 4)

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

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

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

26. A square matrix (a_{ij}) in which $a_{ij} = 0$ for $i \neq j$ and $a_{ij} = k$ (constant) for $i = j$ is [EAMCET 2001]

- 1) Unit matrix 2) Scalar matrix 3) Null matrix 4) Diagonal matrix

Ans: 2

Sol: $\begin{bmatrix} k & 0 & 0 \\ 0 & k & 0 \\ 0 & 0 & k \end{bmatrix} \begin{bmatrix} \therefore a_{ij} = 0 \text{ for } i \neq j \\ a_{ij} = k \text{ for } i = j \end{bmatrix}$

It is a scalar matrix

27. If $A = \begin{bmatrix} 0 & 2 \\ 3 & -4 \end{bmatrix}$, $KA = \begin{bmatrix} 0 & 3a \\ 2b & 24 \end{bmatrix}$, then the values of k, a, b, are respectively [EAMCET 2001]

- 1) $-6, -12, -18$ 2) $-6, 4, 9$ 3) $-6, -4, 9$ 4) $-6, 12, 18$

Ans : 3

Sol: $KA = \begin{bmatrix} 0 & 3a \\ 2b & 24 \end{bmatrix}$

$$\begin{bmatrix} 0 & 2k \\ 3k & -4k \end{bmatrix} = \begin{bmatrix} 0 & 3a \\ 2b & 24 \end{bmatrix}$$

$$\begin{array}{l} -4k = 24 \\ k = -6 \end{array} \left| \begin{array}{l} 2k = 3a \\ -12 = 3a \\ a = -4 \end{array} \right. \left| \begin{array}{l} 3k = 2b \\ -18 = 2b \\ b = -9 \end{array} \right.$$

28. If A and B are two square matrices such that $AB = -A^{-1}BA$ then $(A^2 + B^2) =$ [EAMCET 2000]

- 1) 0 2) $A^2 + B^2$ 3) $A^2 + 2AB + B^2$ 4) $A + B$

Ans: 2

Sol: Given $B = A^{-1}BA$

$$\begin{aligned} (A+B)^2 &= A^2 + AB + BA + B^2 \\ &= A^2 + A(-A^{-1}BA) + BA + B^2 \\ &= A^2 - AA^{-1}BA + BA + B^2 \\ &= A^2 - IBA + BA + B^2 \\ &= A^2 - BA + BA + B^2 \\ &= A^2 + B^2 \end{aligned}$$

29. If $A = \begin{bmatrix} 1 & 3 \\ 2 & 1 \end{bmatrix}$, then the determinant $A^2 - 2A$ is [EAMCET 2000]

- 1) 5 2) 25 3) -5 4) -25

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

$$A^2 = \begin{bmatrix} 7 & 6 \\ 4 & 7 \end{bmatrix}$$

$$A^2 - 2A = \begin{bmatrix} 7 & 6 \\ 4 & 7 \end{bmatrix} - \begin{bmatrix} 2 & 6 \\ 6 & 2 \end{bmatrix} = \begin{bmatrix} 5 & 0 \\ -2 & 5 \end{bmatrix}$$

$$|A^2 - 2A| = 25 - 0 = 25$$

30. If 'd' is the determinant of a square matrix A of order n, then the determinant of its adjoint is

- 1) d^n 2) d^{n-1} 3) d^{n-2} 4) d [EAMCET 2000]

Ans: 2

Sol: $|A| = d$

$$|\text{adj}A| = |A|^{n-1} \\ = d^{n-1}$$

31. If $a \neq 6$, b, c satisfy $\begin{vmatrix} a & 2b & 2c \\ 3 & b & c \\ 4 & a & b \end{vmatrix} = 0$, then $abc =$

[EAMCET 2000]

1) $a + b + c$

2) 0

3) b^3

4) $ab - b - c$

Ans:

Sol: $a(b^2 - ac) - 2b(3b - 4c) + 2c(3a - 4b) = 0$

$$ab^2 - a^2c - 6b^2 + 8bc + 6ac - 8bc = 0$$

$$ab^2 - a^2c - 6b^2 + 6ac = 0$$

$$b^2(a - 6) - ac(a - 6) = 0$$

$$(b^2 - ac)(a - 6) = 0$$

$$b^2 - ac = 0 \quad [\because a \neq 6]$$

$$b^2 = ac$$

$$b^2 \cdot b = abc$$

$$\therefore abc = b^3$$

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