DAV CENTENARY PUBLIC SCHOOL, PASCHIM ENLAVE

CLASS XII - SESSION 2016-17

CHAPTER 4

Determinants

One Mark Questions

Q1. For what value of x : $\begin{bmatrix} 1 & 2 & 3 \\ 2 & 3 & x \\ 1 & 1 & 1 \end{bmatrix}$ is singular.

Q2. If A is a square matrix of order 3 and |A| = 8, Find |AdjA|

Q3. If A(AdjA) = 10**I**. Find |AdjA| where A is a 3x3 matrix.

Q4. If |k A| = 108, |A| = 4 and A is 3X3 matrix. Find K.

Q5. If $\begin{vmatrix} 3 & y \\ x & 1 \end{vmatrix} = \begin{vmatrix} 3 & 2 \\ 4 & 1 \end{vmatrix}$. Find possible values of *x* and *y* where x and y ∈ N **.**

Q6. If $\begin{vmatrix} 3 & m \\ 4 & 5 \end{vmatrix}$ = 3. Find *m*

Q7. If $\Delta = \begin{vmatrix} cos\theta & sin\theta & 1 \\ -sin\theta & cos\theta & 1 \\ 0 & 0 & 2 \end{vmatrix}$ Find M_{33}.

Q8. Using determinants find λ so that (-1, -1), (5, λ), (8,11) lie on the same line.

Q9. Without expanding evaluate :

i) $\begin{vmatrix} 1 & a & a^2-bc \\ 1 & b & b^2-ac \\ 1 & c & c^2-ab \end{vmatrix}$ ii) $\begin{vmatrix} \frac{1}{a} & a & bc \\ \frac{1}{b} & b & ac \\ \frac{1}{c} & c & ab \end{vmatrix}$ iii) $\begin{vmatrix} 41 & 1 & 5 \\ 79 & 7 & 9 \\ 29 & 5 & 3 \end{vmatrix}$

Q10. x + 2y + 3z = 0, 3x + y + λz = 0, x – y + z = 0. Find λ so that system has non trivial solutions.

Four marks questions

Q11. Using properties of determinants, prove the following

a) $\begin{vmatrix} a & a+b & a+2b \\ a+2b & a & a+b \\ a+b & a+2b & a \end{vmatrix} = 9b^2(a+b)b)$ $\begin{vmatrix} x & y & z \\ x^2 & y^2 & z^2 \\ y+z & z+x & x+y \end{vmatrix} = (x+y+z)(x-y)(y-z)(z-x)$

c) $\begin{vmatrix} x+y & x & x \\ 5x+4y & 4x & 2x \\ 10x+8y & 8x & 3x \end{vmatrix} = x^3$.d) $\begin{vmatrix} a & b & ax+by \\ b & c & bx+cy \\ ax+by & bx+cy & 0 \end{vmatrix} = (b^2-ac)(ax^2+2bxy+cy^2)$

e) $\begin{vmatrix} a+b+c & -c & -b \\ -c & a+b+c & -a \\ -b & -a & a+b+c \end{vmatrix} = 2(a+b)(b+c)(c+a)$

f) $\begin{vmatrix} 0 & p-q & p-r \\ q-p & 0 & q-r \\ r-p & r-q & 0 \end{vmatrix} = 0$g) $\begin{vmatrix} 0 & 99 & -998 \\ -99 & 0 & 997 \\ 998 & -997 & 0 \end{vmatrix} = 0$h) $\begin{vmatrix} \frac{a^2+b^2}{c} & c & c \\ a & \frac{c^2+b^2}{a} & a \\ b & b & \frac{a^2+c^2}{b} \end{vmatrix} = 4abc$

Q12. Solve for x : a) $\begin{vmatrix} 7 & 6 & x \\ 2 & x & 2 \\ x & 3 & 7 \end{vmatrix} = 0$ b) $\begin{vmatrix} 15-2x & 11-3x & 7-x \\ 11 & 17 & 14 \\ 10 & 16 & 13 \end{vmatrix} = 0$

c) $\begin{vmatrix} x-2 & 2x-3 & 3x-4 \\ x-4 & 2x-9 & 3x-16 \\ x-8 & 2x-27 & 3x-64 \end{vmatrix} = 0$ d) $\begin{vmatrix} x+2 & x+6 & x-1 \\ x+6 & x-1 & x+2 \\ x-1 & x+2 & x+6 \end{vmatrix}$=0 CBSE 2015

Q13.If f(x) = $\begin{vmatrix} a & -1 & 0 \\ ax & a & -1 \\ ax^2 & ax & a \end{vmatrix}$, Using properties evaluate f(x) hence evaluate f(2x) – f(x)

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Q13. A = $\begin{bmatrix} 3 & 1 \\ 7 & 5 \end{bmatrix}$. Find x and y so that $A^2 + xI = yA$. Hence find A^{-1}

Six marks questions

Q14. Solve using matrices: $\frac{2}{x} + \frac{3}{y} + \frac{10}{z} = 4$, $\frac{4}{x} - \frac{6}{y} + \frac{5}{z} = 1$, $\frac{6}{x} + \frac{9}{y} - \frac{20}{z} = 2$

Q15*. If A = $\begin{bmatrix} 1 & 1 & 1 \\ 1 & 2 & -3 \\ 2 & -1 & 3 \end{bmatrix}$. Find A^{-1} and use it to solve x + y + 2z = 0, x + 2y – z = 9 and

x– 3y + 3z = -14.

Q16. Use product AB to solve the system x – y +2z = 1, 2y – 3z = 1 and 3x -2y + 4z = 2

where A = $\begin{bmatrix} 1 & -1 & 2 \\ 0 & 2 & -3 \\ 3 & -2 & 4 \end{bmatrix}$ and B = $\begin{bmatrix} -2 & 0 & 1 \\ 9 & 2 & -3 \\ 6 & 1 & -2 \end{bmatrix}$.

Q17*. Evaluate using properties : $\begin{vmatrix} a^2 & (b+c)^2 & bc \\ b^2 & (c+a)^2 & ca \\ c^2 & (a+b)^2 & ab \end{vmatrix}$

Q18. The management committee of a residential colony decided to award some of its members (say x) for honesty, some (say y) for helping others and some other (say z) for supervising the workers to keep the colony neat and clean. The sum of all the awardees is 12. Three times the sum of awardees for cooperation and supervision added to two times the number of awardees for honesty is 33. If the sum of the number of awardees for honesty and supervision is twice the number of awardees for helping others, using matrix method, find the number of awardees of each category. Apart from these value, namely, honesty, cooperation and supervision, suggest one more value which the management of the colony must include for awards.

Q19. Two schools A and B want to award their selected students on the values of sincerity, truthfulness and helpfulness. The school A wants to award Rs x each, Rs y each and Rs z each for the three respective values to 3, 2 and 1 students respectively with a total award money of Rs 1,600. School B wants to spend Rs 2,300 to award its 4, 1 and 3 students on the respective values (by giving the same award money to the three values as before). If the total amount of award for one prize on each value is Rs900, using matrices, find the award money for each value. Apart from these three values, suggest one more value which should be considered for award.