Swotters Academy

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Test / Exam Name: Ch4 - Determinants | **Standard: 12th Science** | **Subject: Mathematics**

Student Name: .... **Section:** .... **Roll No.:** ....

Questions: 28	Time: 01:45 hh:mm	Marks: 50

Instructions

1. Rough work at the last page should be in proper manner too
2. New section on new page
3. Honesty is the best policy.

SECTION-A

Q1. If |A| = 2, where A is a 2 × 2 matrix, then $|4A^{-1}|$ equals: **1 Mark**

A 4 **B** 2 **C** 8 **D** $\frac{1}{32}$

Q2. If A is a non-singular square matrix of order 3 such that $A^2 = 3A$, then value of |A| is: **1 Mark**

A −3 **B** 3 **C** 9 **D** 27

Q3. If $A = \begin{bmatrix} a & 0 & 0 \\ 0 & a & 0 \\ 0 & 0 & a \end{bmatrix}$, then det (adj A) equals: **1 Mark**

A a^{27} **B** a^9 **C** a^6 **D** a^2

Q4. If A is a 3 × 3 matrix and |A| = -2, then value of |A (adj A)| is: **1 Mark**

A -2 **B** 2 **C** -8 **D** 8

Q5. If A is a square matrix of order 3, such that A (adj A) = 10 I, then |adj A| is equal to: **1 Mark**

A 1 **B** 10 **C** 100 **D** 101

Q6. The number of corner points of the feasible region determined by the constraints $x - y \geq 0, 2y \leq x + 2, x \geq 0, y \geq 0$ is: **1 Mark**

A 2 **B** 3 **C** 4 **D** 5

Q7. **Directions:** In the following questions, a statement of assertion (A) is followed by a statement of reason (R). Mark the correct choice as: **1 Mark**

Assertion: The value of x for which $\begin{bmatrix} x & 2 \\ 18 & x \end{bmatrix} = \begin{bmatrix} 6 & 2 \\ 18 & 6 \end{bmatrix}$ is ± 6.

Reason: The determinant of a matrix A order 2x2, $A \begin{bmatrix} a & b \\ c & d \end{bmatrix}$ is = ab - dc.

A Both A and R are true and R is the correct explanation of A.
B Both A and R are true but R is not the correct explanation of A.
C A is true but R is false.
D A is false but R is true.
E Both A and R are false.

Q8. **Directions:** In the following questions, a statement of assertion (A) is followed by a statement of reason (R). Mark the correct choice as: **1 Mark**

Assertion: In a square matrix of order 3 the minor of an element a_{22} is 6 then cofactor of a_{22} is -6.

Reason: Cofactor an element aij = $A_{ij} = (-1)^{i+j} M_{ij}$.

A Both A and R are true and R is the correct explanation of A.
B Both A and R are true but R is not the correct explanation of A.
C A is true but R is false.
D A is false but R is true.
E Both A and R are false.

Q9. If A and B are square matrices each of order 3 and |A| = 5, |B| = 3, then the value of |3 AB| is ______. **1 Mark**

Q10. If A is a square matrix of order 3 and A_{ij} is the cofactor of the element a_{ij} then value of $a_{21} A_{11} + a_{22} A_{12} + a_{23} A_{13}$ is ________. **1 Mark**

Q11. State True or False for the statements of the following Exercise: **1 Mark**

The maximum value of $\begin{vmatrix} 1 & 1 & 1 \\ 1 & 1+\sin\theta & 1 \\ 1 & 1 & 1+\cos\theta \end{vmatrix}$ is $\frac{1}{2}$.

Q12. A is a square matrix of order 3 and | A | = 7. Write the value of | adj. A |. **1 Mark**

Q13. if A is a 3×3 matrix and $|3A| = K|A|$, then write the value of k. **1 Mark**

Q14. Evaluate: **1 Mark**

$\begin{vmatrix} \sin 30^o & \cos 30^o \\ -\sin 60^o & \cos 60^o \end{vmatrix}$.

Q15. If $|x \quad \sin\theta \quad \cos\theta - \sin\theta \quad -x \quad 1 \cos\theta \quad 1 \quad x| = 8$, write the value of x. **1 Mark**

Q16. If A is a non-singular square matrix of order 3 and $A^2 = 2A$, then find the value of |A|. **1 Mark**

SECTION-B

Q17. If A and B are square matrices of order 3 such that |A| = – 1, |B| = 3, then find the value of |2AB|. **2 Marks**

Q18. If $\begin{vmatrix} 2x+5 & 3 \\ 5x+2 & 9 \end{vmatrix} = 0$, find x. **2 Marks**

Q19. If A = $[A_{ij}]$ is a 3 × 3 diaginal matrix such that $a_{11} = 1$, $a_{22} = 2$, $a_{33} = 3$, then find |A|. **2 Marks**

Q20. If $A = \begin{bmatrix} 1 & 2 \\ 3 & -1 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 0 \\ -1 & 0 \end{bmatrix}$, find |AB|. **2 Marks**

Q21. Find the maximum value of $\begin{vmatrix} 1 & 1 & 1 \\ 1 & 1+\sin\theta & 1 \\ 1 & 1 & 1+\cos\theta \end{vmatrix}$ **2 Marks**

Q22. Show that the following systems of linear equations has infinite number of solutions and solve: **2 Marks**

x + 2y = 5,
3x + 6y = 15

Q23. Using properties of determinants, prove the following: **3 Marks**

$\begin{vmatrix} a & b & c \\ a-b & b-c & c-a \\ b+c & c+a & a+b \end{vmatrix} = a^3 + b^3 + c^3 - 3abc$

Q24. If $A = \begin{bmatrix} 2 & 3 \\ 5 & -2 \end{bmatrix}$ be sech that $A^{-1} = kA$, then find the value of k. **3 Marks**

Q25. If $A = \begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix}$, then for any natural number, find the value of Det (A^n). **3 Marks**

SECTION-C

Q26. Using properties of determinants, prove the following: **4 Marks**

$\begin{vmatrix} a^2 & bc & ac+c^2 \\ a^2+ab & b^2 & ac \\ ab & b^2+bc & c^2 \end{vmatrix} = 4a^2b^2c^2$

Q27. Using properties of determinants, prove the following: **4 Marks**

$\begin{vmatrix} 1 & x & x^2 \\ x^2 & 1 & x \\ x & x^2 & 1 \end{vmatrix} = (1 - x^3)^2$.

Q28. **5 Marks**

Let $F(\alpha) = \begin{bmatrix} \cos\alpha & -\sin\alpha & 0 \\ \sin\alpha & \cos\alpha & 0 \\ 0 & 0 & 1 \end{bmatrix}$

and $G(\beta) = \begin{bmatrix} \cos\beta & 0 & \sin\beta \\ 0 & 1 & 0 \\ -\sin\beta & 0 & \cos\beta \end{bmatrix}$

Show that

$[F(\alpha)G(\beta)]^{-1} = G(-\beta)F(-\alpha)$.