BATCH 2018

SESSION: 2021

LINEAR ALGEBRA

GOVT. DEGREE COLLEGE SOPORE

WISE APP CLASS CODE: 327142999

PRACTICE PROBLEMS

Linear Algebra (MCQ)

1. If $A = \left[a_{ij}\right]_{2n+1}$ be a skew-symmetric matrix with trace α and determinant β, then $\alpha^3 + \beta^2 =$

   (a) 0
   (b) 1
   (c) $2n + 1$
   (d) n

2. If $A = \left[a_{ij}\right]_n$ is a non-singular matrix, then $\frac{\sum_{j=1}^{n} a_{3j} A_{3j}}{\sum_{i=1}^{n} a_{i3} A_{i3}} =$

   (a) 0
   (b) 1
   (c) -1
   (d) n

3. A triangular matrix of order 3 has positive integer diagonal entries. If no two diagonal entries in the matrix are the same and the trace of the matrix is 6, then the determinant of the matrix is

   (a) 1
   (b) 2
   (c) 6
   (d) 24

4. If all the entries of a triangular matrix are different, the order of the matrix must be

   (a) 1
   (b) 2
   (c) 3
   (d) 4

5. $$\begin{vmatrix} 1 + \frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \cdots & 0.\overline{9} \\ 2 + \sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2 + \cdots}}}} & 1 \end{vmatrix} =$$

   (a) -1
   (b) 1
   (c) -2
   (d) 2

6. A square matrix of order n has n^2-n+1 zeros. Its determinant

   (a) must be negative
   (b) must be zero
   (c) must be positive
   (d) None

7. The largest number of non-zero entries that a non-singular matrix of order n may have is

   (a) n^2-n-1
   (b) n^2
   (c) n^2-n+1
   (d) n^2-n

8. If $A = \left[a_{ij}\right]_n$, then $tr(AA^t) =$

   (a) $\sum_{j=1}^{n} \sum_{i=1}^{n} a_{ij}$
   (b) $\sum_{j=1}^{n} \sum_{i=1}^{n} {a_{ij}}^2$
   (c) $\sum_{j=1}^{n} \sum_{i=1}^{n} {a_{ij}}^3$
   (d) $\sum_{j=1}^{n} \sum_{i=1}^{n} {a_{ij}}^4$

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9. If $A = [a_{ij}]_3$, $S_{r1(A)}, S_{r2(A)}, S_{r3(A)}$ represent respectively the sum of first, second, three rows of A, $S_{r1(Adj.(A))}, S_{r2(Adj.(A))}, S_{r3(Adj.(A))}$ represent respectively that of the $Adj(A)$, then
$$\left(S_{r1(A)} + S_{r2(A)} + S_{r3(A)}\right) \times \left(S_{r1(Adj.(A))} + S_{r2(Adj.(A))} + S_{r3(Adj.(A))}\right) =$$

   (a) $|A|$
   (b) $2|A|$
   (c) $3|A|$
   (d) $9|A|$

10. Let $A = [a_{ij}]_n$ such that $a_{ij} \in \{1,2,3, \dots, n^2\}$ and no two entries in A are the same. Then $tr(AA^t) =$

   (a) $\frac{n^2(n^2+1)(2n^2+1)}{2}$
   (b) $\frac{n^2(n^2+1)(2n^2+1)}{3}$
   (c) $\frac{n^2(n^2+1)(2n^2+1)}{6}$
   (d) $\frac{n^2(n^2+1)(2n^2+1)}{12}$

11. If $A = [a_{ij}]_8$ so that $|A| = 2$, then $|A^{-1}Adj(A)| =$

   (a) 64
   (b) 128
   (c) 256
   (d) 512

12. If $A = [a_{ij}]_n$, then $|Adj(A^{-1})| =$

   (a) $|A|^{n-1}$
   (b) $\frac{1}{|A|^{n-1}}$
   (c) $|A|^n$
   (d) $\frac{1}{|A|^n}$

13. The rows of the matrix $\begin{bmatrix} 1 & 2 & 3 \\ 6 & 4 & 3 \end{bmatrix}$ are

   (a) Linearly dependent
   (b) Linearly independent
   (c) Both (a) and (b)
   (d) Neither (a) nor (b)

14. The columns of matrix, in which one of the columns is zero, are

   (a) Linearly dependent
   (b) Linearly independent
   (c) Both (a) and (b)
   (d) Neither (a) nor (b)

15. The rows of a non-singular matrix are

   (a) Linearly dependent
   (b) Linearly independent
   (c) Both (a) and (b)
   (d) Neither (a) nor (b)

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16. The rows of a singular matrix are

    (a) Linearly dependent
    (b) Linearly independent
    (c) Both (a) and (b)
    (d) Neither (a) nor (b)

17. The rank of a non-singular matrix is always

    (a) less than the number of rows
    (b) equal to the number of rows
    (c) greater than the number of rows
    (d) None

18. The value of α so that the rank of
    $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & \alpha \end{bmatrix}$ is not 3 is

    (a) 1
    (b) 3
    (c) 6
    (d) 9

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