Assignment 2

EE24BTECH11002 - Agamjot Singh

20) Let a, b, c be such that $b(a+c) \neq 0$ if
$\begin{vmatrix} a & a+1 & a-1 \\ b & b+1 & b-1 \\ c & c-1 & c+1 \end{vmatrix} + \begin{vmatrix} a+1 & b+1 & c-1 \\ a-1 & b-1 & c+1 \\ (-1)^{n+2}a & (-1)^{n+1}b & (-1)^n c \end{vmatrix} = 0$, then the value of n is:

(a) any even integer (b) any odd integer

(c) any integer (d) zero

21) The number of 3×3 non-singular matrices with four entries as 1 and all othe entries as 0, is

(a) 5 (b) 6

(c) atleast 7 (d) less than 4

22) Let A be a 2×2 matrix with non-zero entries and let $A^2 = I$, where I is 2×2 identity matrix. Define
Tr(A) - sum of diagonal elements of A and
$|A|$ - determinant of matrix A.
Statement - 1: Tr(A) = 0.
Statement - 2: $|A| = 1$

(a) Statement - 1 is true, Statement - 2 is true; Statement - 2 is **not** a correct explanation for Statement-1.
(b) Statement - 1 is true, Statement - 2 is false.
(c) Statement - 1 is false, Statement - 2 is true.
(d) Statement - 1 is true, Statement - 2 is true; Statement - 2 is a correct explanation for Statement-1.

23) Consider the system of linear equations;

$$x_1 + 2x_2 + x_3 = 3$$
$$2x_1 + 3x_2 + x_3 = 3$$
$$3x_1 + 5x_2 + 2x_3 = 1$$

(a) exactly 3 solutions
(b) a unique solution
(c) no solution
(d) infinite number of solutions

24) The number of values of k for which the linear equations $4x + ky + 2z = 0$, $kx + 4y + z = 0$ and $2x + 2y + z = 0$ posses a non zero solution is (2011)

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

25) Let A and B be two symmetrix matrices of order 3.
Statement - 1: $A(BA)$ and $(AB)A$ are symmetric matrices.
Statement - 2: AB is symmetric matrix if matrix multiplication of A with B is commutative.

(a) Statement - 1 is true, Statement - 2 is true; Statement - 2 is **not** a correct explanation for Statement-1.
(b) Statement - 1 is true, Statement - 2 is false.
(c) Statement - 1 is false, Statement - 2 is true.
(d) Statement - 1 is true, Statement - 2 is true; Statement - 2 is a correct explanation for Statement-1.

26) Let $A = \begin{pmatrix} 1 & 0 & 0 \\ 2 & 1 & 0 \\ 3 & 2 & 1 \end{pmatrix}$ If u_1 and u_2 are column matrices such that $Au_1 = \begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix}$ and $Au_2 = \begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix}$, then $u_1 + u_2$ is equal to: (2012)

(a) $\begin{pmatrix} -1 \\ 1 \\ 0 \end{pmatrix}$ (b) $\begin{pmatrix} -1 \\ 1 \\ -1 \end{pmatrix}$ (c) $\begin{pmatrix} -1 \\ -1 \\ 0 \end{pmatrix}$ (d) $\begin{pmatrix} 1 \\ -1 \\ -1 \end{pmatrix}$

27) Let P and Q be 3×3 matrices $P \neq Q$. If $P^3 = Q^3$ and $P^2Q = Q^2P$ then determinant of $\left(P^2 + Q^2\right)$ is equal to (2012)

(a) -2 (b) 1 (c) 0 (d) -1

28) If $P = \begin{bmatrix} 1 & \alpha & 3 \\ 1 & 3^3 & \\ 2 & 4 & 4 \end{bmatrix}$ is the adjoint of a 3×3 matrix A and $|A| = 4$, then α is equa l to: ($JEEM2014$)

(a) 4 (b) 11 (c) 5 (d) 0

29) If $\alpha, \beta, \neq 0$, and $f(n) = \alpha^n + \beta^n$ and

$$\begin{vmatrix} 3 & 1+f(1) & 1+f(2) \\ 1+f(1) & 1+f(2) & 1+f(3) \\ 1+f(2) & 1+f(3) & 1+f(4) \end{vmatrix}$$

(*JEEM*2014)

(a) 4 (b) 11 (c) 5 (d) 0