d) All of above

19. If $W = \{(a, b, c) | a + b + c = 0; a, b, c \in \mathbb{R}\}$ is a subspace of $V = \mathbb{R}^3$, then what is dim$W$ =?

a) 3 **b) 2** **c)** 4 **d)** Infinite

20. Consider a system $AX = 0$ of linear equations, where $A = M_{2\times2}(K)$, then which one is true?

a) $X \in K^2$, where K is any field

b) Zero vector does not belong to its solution set

c) The Solution set W of given system is subspace of $\mathbb{R}^n$

d) Given system is non-homogeneous system

21. Two matrices A and B have the same row space if:

a) Both are row equivalent matrices

b) Both are row canonical matrices having different nonzero rows

c) Both have same column entries

d) Both (a) and (b)

22. What will be the rank of matrix $A = \begin{bmatrix} 1 & -2 & 0 & 4 \\ 3 & 1 & 1 & 0 \\ -1 & -5 & -1 & 8 \\ 3 & 8 & 2 & -12 \end{bmatrix}$?

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

23. If $U = \{(x, x): x \in \mathbb{R}\}$ and $V = \{(x, -x): x \in \mathbb{R}\}$, then which one is true?

a) $U \oplus V = \mathbb{R}^2$ **c)** $U \oplus V = \mathbb{R}$

b) $U + V = \mathbb{R}$ **d) $U + V = \mathbb{R}^2$**

24. If $U = \{(a, 2a): a \in \mathbb{R}\}$ and $V = \{(b, 3b): b \in \mathbb{R}\}$, then dim$(U \oplus V)$ =?

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

25. Any Linearly independent set of vectors in vector space V can be made basis of V by:

a) Discarding some vectors **c) Adding zero vector**

b) Adding more vectors **d)** Leaving it same

26. If $V = P_2(t)$ and $S = \{(t + 2), (t - 7), (t^2 + 2t + 1)\}$, then what will be the coordinate vector $[v]_s$ of $v = t^2 - 6t + 10$ relative to S?

a) $[3, -4,2]$ **c)** $[-2,7.5, -1]$

b) $[0, -10,5.2]$ **d)** $[\mathbf{-5.2}, \mathbf{-2.7}, \mathbf{1}]$

27. If $V = \mathbb{R}^3$ and coordinate vector of $v = (5,2,7)$ is $[v]_s = [5,2,7]$, then what is basis relative to v?

a) $S_1 = \{(1, -1,0), (1,1,0), (0,1,1)\}$ **c) $S_2 = \{(\mathbf{1}, \mathbf{0}, \mathbf{0}), (\mathbf{0}, \mathbf{1}, \mathbf{0}), (\mathbf{0}, \mathbf{0}, \mathbf{1})\}$**

b) $S_3 = \{(-1,0,1), (0,0,1), (1,1,0)\}$ **d)** $S_4 = \{(0,0,0), (1,1,0), (1,0,1)\}$

28. Which vector/set induces a one-to-one correspondence between V and K^n to show isomorphism?

a) Basis Set **b)** Coordinate Vector **c)** Spanning Set **d)** Both (a) and (b)

29. What will be the dimension of subspace spanned by coordinate vectors:

$[A] = [1,2,6,0,0,0]$, $[B] = [2,3,4,1, -1, -3]$, $[C] = [2,0,7,3,4, -2]$

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

30. Let A be any $m \times n$ matrix over K.Then which mapping is determined by A?

a) $F_A: K^n \times K^m$ **b)** $F_A: K^n \times \mathbb{R}$ **c)** $F_A: \mathbb{R} \times K^m$ **d)** $F_A: K^m \times K^n$

31. Which of the function/mapping is neither one-to-one nor onto?