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The right answer is a for all 14 questions

Exam I

The RIGHT ANSWER is a for all 14 questions

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QUESTION 1. (i) Let $T : R^2 \to R^2$ be a L. T such that $T(2,0) = (4,6)$ and $T(0,3) = (6,12)$. The standard matrix presentation of T, M, is

(a) $M = \begin{bmatrix} 2 & 2 \\ 3 & 4 \end{bmatrix}$ (b) $M = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ (c) $M = \begin{bmatrix} 2 & 3 \\ 2 & 4 \end{bmatrix}$ (d) $M = \begin{bmatrix} 4 & 6 \\ 6 & 12 \end{bmatrix}$

(ii) Let $T : R^2 \to R$ be a L. T such that $T(2,2) = 4$ and $T(0,3) = 6$. Then $T(1,7) =$

(a) 14 (b) 10 (c) 15 (d) 13

(iii) Let $T : R^3 \to R^2$ such that $T(x_1, x_2, x_3) = (x_1 - 2x_3, -2x_1 + 4x_3)$. The set of all points (vectors) in R^3 where $T(x_1, x_2, x_3) = (5, -10)$ is

(a) $\{(5 + 2x_3,\ x_2,\ x_3) \mid x_2, x_3 \in R\}$ (b) span$\{(5,0,0)\}$ (c) span$\{(5,0,0),(2,0,1),(0,1,0)\}$
(d) $\{(5 + 2x_3,\ 0,\ x_3) \mid x_3 \in R\}$ (e) span$\{(2,0,1),(0,1,0)\}$

(iv) Let T as in (iii). The $Ker(T) =$

(a) span$\{(2,0,1),(0,1,0)\}$ (b) span$\{(0,1,0)\}$ (c) $\{(2x_3,\ 0,\ x_3) \mid x_3 \in R\}$ (d) span$\{(2,1,1)\}$

(v) One of the following is a linear transformation from R^3 to R^2

(a) $T(x_1, x_2, x_3) = (-5x_1 + 10x_2,\ x_1 + 2x_3)$ (b) $T(x_1, x_2, x_3) = (x_2,\ 4)$
(c) $T(x_1, x_2, x_3) = (0, x_1x_3)$ (d) $T(x_1, x_2, x_3) = (2 + x_1,\ x_2)$ (e) (b) and (c)

(vi) Let $D = span\{(1,-1,-1),(1,0,0),(3,-1,-1)\}$. A basis for D is

(a) $B = \{(1,-1,-1),\ (1,0,0)\}$ (b) $B = \{(1,-1,-1),\ (1,0,0),(3,-1,-1)\}$
(c) $B = \{(1,-1,-1),(0,-1,2)\}$ (d) $B = \{(1,-1,-1)\}$ (e) (a) and (c)

(vii) Let D be as in (vi). One of the following points (vectors) belongs to D.

(a) (6, -3, -3) (b) (5, 2, -2) (c) (5, -4, 4) (d) (10, 4, -4)

(viii) Let $D = \{(a - 2b, 2a - 4b, a, b) \mid a, b \in R\}$. Then $dim(D) =$

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

(ix) One of the following is a subspace of R^3,

(a) $D = \{(3b - c,\ b,\ c) \mid b, c \in R\}$ (b) $\{(3bc,\ b,\ c) \mid b, c \in R\}$ (c) $\{(3,\ b,\ c) \mid b, c \in R\}$
(d) $\{(3c,\ b,\ c) \mid b,\ c \geq 0\}$ (e) a, c

(x) Let $D = \{(a-2b+3c, -2a+4b-6c, -a+2b-3c, 3a-6b+9c) \mid a,b,c \in R\}$ be a subspace of R^4. A basis for D is

(a) $B = \{(1,-2,-1,3)\}$ (b) $B = \{(-2,4,2,-6),\ (3,-6,-3,9)\}$
(c) $B = \{(1,-2,-1,3),\ (-2,4,2,-6),\ (3,-6,-3,9)\}$

(xi) Let D as in (x). One of the following point (vector) belongs to D.

(a) (-6, 12, 6, -18) (b) (-1, -2, 1, -3) (c) (-3, -6, 3, -9) (d) (-4, 8, 4, 12)

(xii) Let $A = \begin{bmatrix} 1 & 2 & 2 & 4 \\ 5 & 6 & 6 & 7 \end{bmatrix}$, $B \begin{bmatrix} 7 & 8 & 0 & 4 \\ 5 & 1 & 1 & 8 \\ 7 & 1 & -1 & 1 \\ -9 & 9 & 0 & 3 \end{bmatrix}$ and $AB = C$. The third column of C, i.e., C_3 is

(a) $\begin{bmatrix} 0 \\ 0 \end{bmatrix}$ (b) $\begin{bmatrix} 4 \\ 12 \end{bmatrix}$ (c) $\begin{bmatrix} 0 \\ 0 \\ 2 \\ 6 \end{bmatrix}$ (d) $\begin{bmatrix} 0 \\ 0 \\ 4 \\ 12 \end{bmatrix}$

(xiii) Let Q_1, Q_2, Q_3, Q_4 be independent points (vectors) in R^4. Then

(a) The only solution to $c_1Q_1 + c_2Q_2 + c_3Q_3 + c_4Q_4 = (0,0,0,0)$ is $c_1 = c_2 = c_3 = c_4 = 0$.
(b) It is possible that $Q_1 = c_2Q_2 + c_3Q_3$ for some $c_1, c_2 \in R$.
(c)It is possible that $span\{Q_1, Q_2, Q_3, Q_4\} \neq R^4$.

(xiv) The solution set to the homogeneous system

$$x_2 - x_3 - 4x_4 = 0,\ x_1 - x_2 - 3x_3 - x_4 = 0,\ 2x_2 - 2x_3 - 8x_4 = 0$$

(a) $span\{(4,1,1,0),\ (5,4,0,1)\}$ (b) $\{(-4x_3 - 5x_4, -x_3 - 4x_4, x_3, x_4) \mid x_3, x_4 \in R\}$
(c) $span\{(5,4,0,1)\}$ (d) $\{(-4x_3 - 5x_4, x_3 + 4x_4, x_3, x_4) \mid x_3, x_4 \in R\}$

Faculty information