Let $T : P_4 \to P_4$ **be linear map such that** $T(p) = p''$**, then** $rank(T) =$

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

- A
- B
- C
- D

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Let $u = (u_1, u_2, u_3)$ and $v = (v_1, v_2, v_3)$ in R^3 such that $< u, v >= 2u_1v_1 + 2u_2v_2 + 3u_3v_3$. If $u = (5, -1, 3)$ and $v = (2, k, -2)$ are orthogonal, then $k =$

A) 2
B) 1
C) -8
D) 4

○ A

○ B

Let $T : R^2 \to R^3$ be a linear map, $s_1 = \{(1,-1),(2,1)\}$ is a basis of R^2, $s_2 = \{(1,2,0),(0,1,0),(1,0,1)\}$ is a basis of of R^3 such that $T(1,-1) = (2,3,5)$, $T(2,1) = (1,4,-3)$. Then $T(4,-1) =$

A) $(5,10,7)$

B) $(4,11,-1)$

C) $(6,14,4)$

D) $(5,11,4)$

- A
- B
- C
- D

Let $T : R^5 \to R^3$ such that
$ker\ T = \{(2s, s, t, s+t, 3t) : s, t \in R\}$, then one of the following is true

A) T is onto but not one - to - one
B) T is isomorphism
C) T is one - to - one but not onto
D) No such linear map exists

A

B

Let V be a vector space with Euclidean inner product, let u and v in V such that $\| u \| = 2$, $\| v \| = 3$ and $< u, v >= 5$, then $\| 3u - v \|^2 =$

A) 20
B) 75
C) 5
D) 15

A

Let A be 3×3 matrix with eigenvalues $3, -2, \frac{1}{4}$, let $B = A^{-2} + I$, then the eigenvalues of B are

A) $\frac{10}{9}, \frac{-5}{4}, 17$
B) $\frac{19}{9}, \frac{9}{4}, 16$
C) $\frac{10}{9}, \frac{5}{4}, 17$
D) $\frac{19}{9}, \frac{9}{4}, 18$

- A
- B
- C
- D

Consider the following system:

$x + 3y + az = 9,$

$-2x - y + bz = -3,$

$4x + 4y + cz = 12.$

If $\begin{vmatrix} 1 & 3 & a \\ -2 & -1 & b \\ 4 & 4 & c \end{vmatrix} = 5$, **and** $x = s_1$, $y = s_2$, $z = s_3$ **is the solution of the system, then** $s_1 + s_2 =$

A) 6

B) 3

C) -3

D) 0

Let $T : R^2 \to R^3$ be a linear map such that $T(x, y) = (2x, 3y, 2y - x)$, then one of the following in *range* T

A) $(2, -3, 3)$
B) $(5, 2, 2)$
C) $(2, 3, 1)$
D) $(2, 2, 1)$

- A
- B
- C
- D

Let A be 5×6 matrix, if $nullity(A^T) = 4$, then $nullity(A) =$

A) 6
B) 5
C) 3
D) 2

- A
- B
- C
- D

Let B $= \begin{bmatrix} e & a+e & a+b+c+f \\ -3 & f & 8 \\ 12 & g-b+a & g \end{bmatrix}$

If B is skew symmetric matrix, then $c =$

A) -14

B) 4

C) -2

D) -26

○ A

○ B

○ C

Let A $= \begin{bmatrix} 2 & 6 \\ 5 & 3 \end{bmatrix}$, then the eigenvalues of A are

A) $2, 3$
B) $6, -1$
C) $7, -2$
D) $8, -3$

- A
- B
- C
- D

Let $T : R^4 \to R^3$ be linear map such that $T(x, y, z, w) = (y - 2x, y + w, z)$, then $ker\ T$ $=$

A) $\{(t, 2t, -2t, 0) : t \in R\}$
B) $\{(t, 2t, 0, -2t) : t \in R\}$
C) $\{(2t, 0, t, -t) : t \in R\}$
D) $\{(t, 2t, 0, 2t) : t \in R\}$

○ A

○ B

If $U = \{(x, y, z) : \; 3x - y - 2z = 0\}$ is a subspace of R^3, then $U^{\perp} =$

A) $\{(x, y, z) : \; \frac{1}{3}x - y + \frac{-1}{2}z = 0\}$
B) $\{(3t, -t, 2t) : \; t \in R\}$
C) $\{(3t, -t, -2t) : \; t \in R\}$
D) $\{(x, y, z) : \; -3x + y + 2z = 0\}$

- A
- B
- C
- D

Let V be inner product space, let $u, v \in V$, then one of the following cannot be true

A) $\| u \| = 3$, $\| v \| = 3$, $< u, v > = 5$
B) $\| u \| = 4$, $\| v \| = 2$, $< u, v > = 7$
C) $\| u \| = 3$, $\| v \| = 3$, $< u, v > = 10$
D) $\| u \| = 7$, $\| v \| = 2$, $< u, v > = 8$

- A
- B
- C
- D

If A, B, C and D are invertible matrices of same size such that

$$DCBA(BA)^{-1}C^{-1}(C^{-1}D)^{-1} = DA^{-1}C^2.$$

Then $C =$

A) $A^{-1}D$

B) AD^{-1}

C) BAD^{-1}

D) $D^{-1}A$

- A
- B
- C
- D