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Submission 6

1 message

Google Forms <forms-receipts-noreply@google.com> Thu, Mar 24, 2022 at 6:27 PM
To: deepanshu21249@iiitd.ac.in

Google Forms

Thanks for filling out Submission 6

Here's what was received.

Edit response

Submission 6

Your email (**deepanshu21249@iiitd.ac.in**) was recorded when you submitted this form.

Question *

Let $\mathbb{P}$ denote the vector space of all polynomials in the variable x having real coefficients.

Let

$$V = \{a_0 + a_0x + a_1x^2 + a_2x^3 \mid a_0, a_1, a_2 \in \mathbb{R}\}$$

Let $T : V \to \mathbb{P}$ be the mapping defined by

$$T(p(x)) = p'(x), \quad \forall p(x) \in V.$$

Choose a correct statement from the following options:

- (●) dim ker T=3
- ( ) dim ker T=2
- ( ) dim ker T=1
- ( ) dim ker T=0
- ( ) dim range T=3
- ( ) dim range T=2
- ( ) dim range T=1
- ( ) Other:

Question *

Let $\mathcal{C}(\mathbb{R})$ be the vector space of all continuous real valued functions defined on $\mathbb{R}$.

Let $W = \text{Span}\{1, \sin x, \sin^2 x, \cos x, \cos^2 x\} \subset V$.

Let $T : W \to \mathbb{R}$ be the linear transformation defined by

$$T(f) = f(0), \quad \forall f \in W.$$

Choose a correct statement from the following:

- dim ker T=2, dim range T=0
- dim ker T=2, dim range T=1
- dim ker T=3, dim range T=0
- **dim ker T=3, dim range T=1**
- dim ker T=1, dim range T=1
- dim ker T=1, dim range T=0
- dim ker T=0, dim range T=1
- dim ker T=0, dim range T=0
- dim ker T=4, dim range T=1
- dim ker T=4, dim range T=0
- Other:

Question *

Let $V = M_{m\times n}(\mathbb{R})$ be the vector space of all $m \times n$ matrices having real entries, where $m, n \in \mathbb{N}$ and $n > 1$.

Let $T : V \to \mathbb{R}^m$ be defined by

$$T(A) = \text{ the sum of the first and last columns of } A, \quad \forall A \in V.$$

For example, if $m = 3$, $n = 4$, and

$$A = \begin{bmatrix} 1 & 2 & 1 & 2 \\ 7 & 6 & 2 & 2 \\ 1 & 2 & 1 & 7 \end{bmatrix}, \quad \text{then } T(A) = \begin{bmatrix} 3 \\ 9 \\ 8 \end{bmatrix}$$

Let B be the matrix of T with respect to some bases $\mathcal{B}$ and $\mathcal{C}$ respectively.

Chooose a correct statement from the following options:

- B is a matrix of size m x mn
- **B is a matrix of size mn x m**
- B is a matrix of size n x mn
- B is a matrix of size mn x n
- B is a matrix of size m x n
- Other: _____

Question *

$$A = \begin{bmatrix} 0 & 1 & 2 \\ 0 & 0 & 3 \\ 0 & 0 & 0 \end{bmatrix}$$

Let $B = A^2$.

Choose a correct statement from the following options:

- (●) dim col B=1, dim null B=2, dim col A=2 and dim null A=1
- ( ) dim col B=2, dim null B=1, dim col A=1 and dim null A=2
- ( ) dim col B=0, dim null B=3, dim col A=1 and dim null A=2
- ( ) dim col B=3, dim null B=0, dim col A=2 and dim null A=1
- ( ) Other: _____