

Course outline

How does an NPTEL online course work?

Week-0

Week-1

- Lec 01- Vector Properties: Addition, Linear Combination, Inner Product, Orthogonality, Norm
- Lec 02- Vectors: Unit Norm Vector, Cauchy-Schwarz inequality, Radar Application
- Lec 03- Inner Product Application: Beamforming in Wireless Communication Systems
- Lec 04- Matrices, Definition, Addition and Multiplication of Matrices
- Lec 05- Matrix: Column Space, Linear Independence, Rank of Matrix, Gaussian Elimination

Quiz : Assignment-1

Feedback for Week 1

Solution-1

Week-2

Week-3

Week-4

Week-5

Week-6

Week-7

Week-8

Week-9

Week-10

Week-11

Week-12

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Assignment-1

The due date for submitting this assignment has passed.

Due on 2021-02-03, 23:59 IST.

As per our records you have not submitted this assignment.

- 1) Consider the vectors $\bar{\mathbf{u}}_i$ and scalar quantities α_i for $i = 1, 2, \dots, m$. The quantity $\alpha_1 \bar{\mathbf{u}}_1 + \alpha_2 \bar{\mathbf{u}}_2 + \dots + \alpha_m \bar{\mathbf{u}}_m$

1 point

is termed a

- Linear sum
 Linear combination
 Vector sum
 Vector weighting

No, the answer is incorrect.
Score: 0
Accepted Answers:
Linear combination

- 2) Consider the real vectors $\bar{\mathbf{u}}, \bar{\mathbf{v}}$ of size $n \times 1$. The inner product of $\bar{\mathbf{u}}, \bar{\mathbf{v}}$ is defined as

1 point

- $\bar{\mathbf{u}}\bar{\mathbf{v}}$

 $\bar{\mathbf{u}}^T \bar{\mathbf{v}}^T$

 $(\bar{\mathbf{u}}\bar{\mathbf{v}})^T$

 $\bar{\mathbf{u}}^T \bar{\mathbf{v}}$

No, the answer is incorrect.
Score: 0
Accepted Answers:
 $\bar{\mathbf{u}}^T \bar{\mathbf{v}}$

- 3) Consider the complex vectors $\bar{\mathbf{u}}, \bar{\mathbf{v}}$ of size $n \times 1$. The inner product of $\bar{\mathbf{u}}, \bar{\mathbf{v}}$ is defined as

1 point

- $\bar{\mathbf{u}}\bar{\mathbf{v}}^H$

 $\bar{\mathbf{u}}^T \bar{\mathbf{v}}^H$

 $\bar{\mathbf{u}}^H \bar{\mathbf{v}}$

 $\bar{\mathbf{u}}^T \bar{\mathbf{v}}$

No, the answer is incorrect.
Score: 0
Accepted Answers:
 $\bar{\mathbf{u}}^H \bar{\mathbf{v}}$

- 4) The vectors $\bar{\mathbf{u}} = \begin{bmatrix} 1 \\ -2 \\ 3 \end{bmatrix}$, $\bar{\mathbf{v}} = \begin{bmatrix} 1 \\ 2 \\ 1 \end{bmatrix}$ are

1 point

- Only Linearly independent but NOT orthogonal
 Only Orthogonal but NOT linearly independent
 Both orthogonal and linearly independent
 Neither orthogonal nor linearly independent

No, the answer is incorrect.
Score: 0
Accepted Answers:
Both orthogonal and linearly independent

- 5) Consider the possibly complex vector $\bar{\mathbf{x}} = \begin{bmatrix} x_1 \\ \vdots \\ x_n \end{bmatrix}$. Its Euclidean norm is

1 point

- $\sqrt{x_1^2 + x_2^2 + \dots + x_n^2}$

 $x_1^2 + x_2^2 + \dots + x_n^2$

 $\sqrt{|x_1|^2 + |x_2|^2 + \dots + |x_n|^2}$

 $|x_1|^2 + |x_2|^2 + \dots + |x_n|^2$

No, the answer is incorrect.
Score: 0
Accepted Answers:
 $\sqrt{|x_1|^2 + |x_2|^2 + \dots + |x_n|^2}$

- 6) Consider a vector $\bar{\mathbf{u}}$. Let $\bar{\mathbf{v}} = \frac{\bar{\mathbf{u}}}{\|\bar{\mathbf{u}}\|^2}$. The quantity $\|\bar{\mathbf{v}}\|$ equals

1 point

- $\frac{1}{\|\bar{\mathbf{u}}\|}$

 1

 $\|\bar{\mathbf{u}}\|$

 $\frac{1}{\|\bar{\mathbf{u}}\|^2}$

No, the answer is incorrect.
Score: 0
Accepted Answers:
 $\frac{1}{\|\bar{\mathbf{u}}\|}$

- 7) Consider the complex sinusoidal vector $\bar{\mathbf{u}}(f) = [1 \quad e^{j2\pi f} \quad e^{j4\pi f} \quad \dots \quad e^{j2(N-1)\pi f}]^T$

1 point

 Then, $\|\bar{\mathbf{u}}(f)\|$ equals

- N

 N^2

 $N e^{j2\pi f}$

 \sqrt{N}

No, the answer is incorrect.
Score: 0
Accepted Answers:
 \sqrt{N}

- 8) Consider the complex sinusoidal vector $\bar{\mathbf{u}}(f) = [1 \quad e^{j2\pi f} \quad e^{j4\pi f} \quad \dots \quad e^{j2(N-1)\pi f}]^T$

1 point

 Then, $\bar{\mathbf{u}}^H \left(\frac{k}{N} \right) \bar{\mathbf{u}} \left(\frac{l}{N} \right)$, for $l \neq k$, equals

- 1

 $N e^{\frac{j2\pi x}{N}}$

 0

 $k l e^{\frac{j2\pi x}{N}}$

No, the answer is incorrect.
Score: 0
Accepted Answers:
 0

- 9) The Cauchy-Schwarz inequality for complex vectors $\bar{\mathbf{u}}, \bar{\mathbf{v}}$ of size $n \times 1$ is given as

1 point

- $|\bar{\mathbf{u}}^H \bar{\mathbf{v}}| \leq \|\bar{\mathbf{u}}\| \|\bar{\mathbf{v}}\|$

 $|\bar{\mathbf{u}}^H \bar{\mathbf{v}}| \leq \|\bar{\mathbf{u}}\|^2 \|\bar{\mathbf{v}}\|^2$

 $|\bar{\mathbf{u}}^H \bar{\mathbf{v}}| \geq \|\bar{\mathbf{u}}\| \|\bar{\mathbf{v}}\|$

 $|\bar{\mathbf{u}}^H \bar{\mathbf{v}}| \geq \|\bar{\mathbf{u}}\| \|\bar{\mathbf{v}}\|$

No, the answer is incorrect.
Score: 0
Accepted Answers:
 $|\bar{\mathbf{u}}^H \bar{\mathbf{v}}| \leq \|\bar{\mathbf{u}}\| \|\bar{\mathbf{v}}\|$

- 10) Consider a complex vector $\bar{\mathbf{x}} = [x_1 \quad x_2 \quad \dots \quad x_n]^T$. Then, $\bar{\mathbf{x}}^H$ is

1 point

- $[x_1 \quad x_2 \quad \dots \quad x_n]$

 $[x_1^* \quad x_2^* \quad \dots \quad x_n^*]^T$

 $[x_1^* \quad x_2^* \quad \dots \quad x_n^*]^*$

 $[x_1^* \quad x_2^* \quad \dots \quad x_n^*]$

No, the answer is incorrect.
Score: 0
Accepted Answers:
 $[x_1^* \quad x_2^* \quad \dots \quad x_n^*]$