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 $\bar{u}_i$ and scalar quantities α_i for $i = 1, 2, \cdots, m$. The quantity

$$\alpha_1 \bar{u}_1 + \alpha_2 \bar{u}_2 + \cdots + \alpha_m \bar{u}_m$$

is termed a *1 point*

- Linear sum
- Linear combination
- Vector sum
- Vector weighting

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

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

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

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

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

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

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

4) The vectors $\bar{u} = \begin{bmatrix} 1 \\ -2 \\ 3 \end{bmatrix}, \bar{v} = \begin{bmatrix} 1 \\ 2 \\ 1 \end{bmatrix}$ 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 $\bar{x} = \begin{bmatrix} x_1 \\ \vdots \\ x_n \end{bmatrix}$. Its Euclidean norm is *1 point*

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

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

6) Consider a vector $\bar{u}$. Let $\bar{v} = \frac{\bar{u}}{\|\bar{u}\|^2}$. The quantity $\|\bar{v}\|$ equals *1 point*

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

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

7) Consider the complex sinusoidal vector *1 point*

$$\bar{u}(f) = \begin{bmatrix} 1 & e^{j2\pi f} & e^{j4\pi f} & \cdots & e^{j2(N-1)\pi f} \end{bmatrix}^T$$

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

- N
- N^2
- $Ne^{j2\pi f}$
- $\sqrt{N}$

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

8) Consider the complex sinusoidal vector *1 point*

$$\bar{u}(f) = \begin{bmatrix} 1 & e^{j2\pi f} & e^{j4\pi f} & \cdots & e^{j2(N-1)\pi f} \end{bmatrix}^T$$

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

- 1
- $Ne^{\frac{j2\pi}{N}}$
- 0
- $kle^{\frac{j2\pi}{N}}$

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

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

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

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

10) Consider a complex vector $\bar{x} = \begin{bmatrix} x_1 & x_2 & \cdots & x_n \end{bmatrix}^T$. Then, $\bar{x}^H$ is *1 point*

- $\begin{bmatrix} x_1 & x_2 & \cdots & x_n \end{bmatrix}$
- $\begin{bmatrix} x_1^* & x_2^* & \cdots & x_n^* \end{bmatrix}^T$
- $\begin{bmatrix} x_1^* & x_2^* & \cdots & x_n^* \end{bmatrix}^*$
- $\begin{bmatrix} x_1^* & x_2^* & \cdots & x_n^* \end{bmatrix}$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$\begin{bmatrix} x_1^* & x_2^* & \cdots & x_n^* \end{bmatrix}$