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NPTEL

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Courses » Applied Optimization for Wireless, Machine Learning, Big-Data

Announcements **Course** Ask a Question Progress Mentor FAQ

Unit 4 - Week 2: Introduction to Convex Optimization – Convex sets, Hyperplanes/ Half-spaces etc. Application: Power constraints in Wireless Systems

Assignment-2

The due date for submitting this assignment has passed.

As per our records you have not submitted this assignment.

Due on 2018-08-15, 23:59 IST.

1) Triangle inequality for vectors is *1 point*

- $||\bar{\mathbf{u}}+\bar{\mathbf{v}}|| \leq (||\bar{\mathbf{u}}||+||\bar{\mathbf{v}}||)^2$
- $||\bar{\mathbf{u}}+\bar{\mathbf{v}}|| \leq ||\bar{\mathbf{u}}||^2||\bar{\mathbf{v}}||^2$
- $||\bar{\mathbf{u}}+\bar{\mathbf{v}}|| \leq ||\bar{\mathbf{u}}||+||\bar{\mathbf{v}}||$
- $||\bar{\mathbf{u}}^T\bar{\mathbf{v}}|| \leq ||\bar{\mathbf{u}}||^2||\bar{\mathbf{v}}||^2$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$||\bar{\mathbf{u}}+\bar{\mathbf{v}}|| \leq ||\bar{\mathbf{u}}||+||\bar{\mathbf{v}}||$

2) Cauchy-Schwarz inequality for two real vectors is *1 point*

- $\bar{\mathbf{u}}^T\bar{\mathbf{v}} \leq ||\bar{\mathbf{u}}||^2||\bar{\mathbf{v}}||^2$
- $|\bar{\mathbf{u}}^T\bar{\mathbf{v}}| \leq ||\bar{\mathbf{u}}|| \ \ ||\bar{\mathbf{v}}||$
- $(\bar{\mathbf{u}}^T\bar{\mathbf{v}})^2 \geq ||\bar{\mathbf{u}}|| \ \ ||\bar{\mathbf{v}}||$

ce De

3)The cosine of the angle between two real vectors is *1 point*

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

$$\frac{(\bar{\mathbf{u}}^T\bar{\mathbf{v}})^2}{||\bar{\mathbf{u}}||^2\ \ ||\bar{\mathbf{v}}||^2}$$

$$\frac{(\bar{\mathbf{u}}^T\bar{\mathbf{v}})^2}{||\bar{\mathbf{u}}||\ \ ||\bar{\mathbf{v}}||}$$

$$\frac{\bar{\mathbf{u}}^T\bar{\mathbf{v}}}{||\bar{\mathbf{u}}||^2\ \ ||\bar{\mathbf{v}}||^2}$$

No, the answer is incorrect.
Score: 0

Accepted Answers:

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

4) The inner product $<\mathbf{A},\mathbf{B}>$ of two real matrices $\mathbf{A},\mathbf{B}$ can be defined as *1 point*

$\mathbf{AB}$

$\mathbf{A}^T\mathbf{B}$

$\mathrm{Tr}(\mathbf{A}^T\mathbf{B})$

$||\mathbf{AB}||$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$\mathrm{Tr}(\mathbf{A}^T\mathbf{B})$

5) *1 point*

The reduced row echelon form of the matrix $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$ is

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

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

$$\begin{bmatrix} 1 & 2 & 3 \\ 0 & -3 & -5 \\ 0 & 0 & 4 \end{bmatrix}$$

$\begin{bmatrix} 1 & 2 & 3 \\ 0 & -3 & -6 \\ 0 & 0 & 0 \end{bmatrix}$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$\begin{bmatrix} 1 & 2 & 3 \\ 0 & -3 & -6 \\ 0 & 0 & 0 \end{bmatrix}$

6) The rank of the matrix $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$ is *1 point*

- 0
- 1
- 2
- 3

No, the answer is incorrect.
Score: 0

Accepted Answers:
2

7) The null space of a matrix $\mathbf{A}$ is *1 point*

- Matrix of size $\mathbf{A}$ with all entries 0
- Vector with size equal to number of columns of $\mathbf{A}$ with all entries 0
- Any matrix $\mathbf{B}$ such that $\mathrm{Tr}(\mathbf{A}^T\mathbf{B}) = 0$
- Subspace of all vectors $\bar{\mathbf{x}}$ such that $\mathbf{A}\bar{\mathbf{x}} = 0$

No, the answer is incorrect.
Score: 0

Accepted Answers:
Subspace of all vectors $\bar{\mathbf{x}}$ such that $\mathbf{A}\bar{\mathbf{x}} = 0$

8) Consider the vectors $\begin{bmatrix} 1 \\ 2 \\ 1 \end{bmatrix}, \begin{bmatrix} 1 \\ 1 \\ 2 \end{bmatrix}$. The set of orthonormal vectors derived by Gram-Schmidt Orthonormalization is *1 point*

- $\frac{1}{\sqrt{6}}\begin{bmatrix} 1 \\ 2 \\ 1 \end{bmatrix}, \frac{1}{\sqrt{66}}\begin{bmatrix} 1 \\ -4 \\ 7 \end{bmatrix}$
- $\frac{1}{\sqrt{6}}\begin{bmatrix} 1 \\ 2 \\ 1 \end{bmatrix}, \frac{1}{\sqrt{49}}\begin{bmatrix} -2 \\ 6 \\ 3 \end{bmatrix}$
-

Radar for target detection, Array Processing, MUSIC, MIMO-Radar Schemes for Enhanced Target Detection

Week 12: Application: Convex optimization for Big Data Analytics, Recommender systems, User Rating Prediction and Optimization for Finance

Transcripts

$\frac{1}{6}\begin{bmatrix}1\\2\\1\end{bmatrix}, \frac{1}{35}\begin{bmatrix}-5\\3\\-1\end{bmatrix}$

$\frac{1}{\sqrt{6}}\begin{bmatrix}1\\2\\1\end{bmatrix}, \frac{1}{\sqrt{26}}\begin{bmatrix}1\\4\\3\end{bmatrix}$

No, the answer is incorrect.
Score: 0

Accepted Answers:

$\frac{1}{\sqrt{6}}\begin{bmatrix}1\\2\\1\end{bmatrix}, \frac{1}{\sqrt{66}}\begin{bmatrix}1\\-4\\7\end{bmatrix}$

9) The nullity or dimension of the null space of $\begin{bmatrix}1 & 2 & 3\\4 & 5 & 6\\7 & 8 & 9\end{bmatrix}$ is *1 point*

- 0
- 1
- 2
- 3

No, the answer is incorrect.
Score: 0

Accepted Answers:
1

10) Consider the matrix $\mathbf{A} = [\bar{\mathbf{u}}_1 \quad \bar{\mathbf{u}}_2 \quad \cdots \quad \bar{\mathbf{u}}_n]$ of size $m \times n$, with $m \geq n$ and the vectors $\bar{\mathbf{u}}_i$ are real and pairwise orthogonal. Which of the following properties are always true *1 point*

i The matrix $\mathbf{A}$ is invertible
ii $\mathbf{A}$ has full rank
iii $\mathbf{A}^T\mathbf{A} = \mathbf{I}$, where $\mathbf{I}$ denotes the identity matrix
iv $\mathbf{A}^T\mathbf{A}$ is diagonal

- i, iii
- ii, iv
- i,iv
- ii, iii

No, the answer is incorrect.
Score: 0

Accepted Answers:
ii, iv

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