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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 6 - Week 4 : Convex Optimization problems, Linear Program, Application: Power allocation in Multi-cell cooperative OFDM

Assignment - 4

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2018-09-05, 23:59 IST.

1) Set S is convex if for any two points $\bar{\mathbf{x}}_1,\ \bar{\mathbf{x}}_2 \in S$, *1 point*

- $\theta\bar{\mathbf{x}}_1 + \theta\bar{\mathbf{x}}_2 \in S,\ \text{for all}\ \ \theta \geq 0$
- $\theta\bar{\mathbf{x}}_1 + \theta\bar{\mathbf{x}}_2 \in S,\ \text{for all}\ \ 1 \geq \theta \geq 0$
- $\theta\bar{\mathbf{x}}_1 + (1-\theta)\bar{\mathbf{x}}_2 \in S,\ \text{for all}\ \ 1 \geq \theta \geq 0$
- $\theta\bar{\mathbf{x}}_1 + (1-\theta)\bar{\mathbf{x}}_2 \in S,\ \text{for all}\ \ \theta$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$\theta\bar{\mathbf{x}}_1 + (1-\theta)\bar{\mathbf{x}}_2 \in S,\ \text{for all}\ \ 1 \geq \theta \geq 0$

2) Set S is convex if for any two points $\bar{\mathbf{x}}_1,\ \bar{\mathbf{x}}_2 \in S$, *1 point*

- Line joining $\bar{\mathbf{x}}_1,\ \bar{\mathbf{x}}_2$ is partly contained in S
- Line joining $\bar{\mathbf{x}}_1,\ \bar{\mathbf{x}}_2$ is fully contained in S
- Line segment between $\bar{\mathbf{x}}_1,\ \bar{\mathbf{x}}_2$ is partly contained in S

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3) Which of the following sets is convex *1 point*

i. Hyperplane

ii. Halfspace

iii. Norm Ball

iv. Ellipsoid

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

No, the answer is incorrect.
Score: 0

Accepted Answers:
i,ii,iii,iv

4) Equivalent representation of a norm ball of radius r and center $\bar{\mathbf{x}}_c$ is *1 point*

- $S = \{\bar{\mathbf{x}}_c + r\bar{\mathbf{u}}| \ \ ||\bar{\mathbf{u}}|| \leq 1\}$
- $S = \{\bar{\mathbf{x}}_c + r\bar{\mathbf{u}}\}$
- $S = \{\bar{\mathbf{x}}_c + r\bar{\mathbf{u}}| \ \ ||\bar{\mathbf{u}}|| = 1\}$
- $S = \{r\bar{\mathbf{x}}_c + \bar{\mathbf{u}}| \ \ ||\bar{\mathbf{u}}|| \leq 1\}$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$S = \{\bar{\mathbf{x}}_c + r\bar{\mathbf{u}}| \ \ ||\bar{\mathbf{u}}|| \leq 1\}$

5) Equivalent representation of a general ellipsoid with center $\bar{\mathbf{x}}_c$ is *1 point*

- $S = \{\mathbf{A}\bar{\mathbf{x}}_c + \bar{\mathbf{u}}| \ \ ||\bar{\mathbf{u}}|| \leq 1\}$
- $S = \{\bar{\mathbf{x}}_c + \mathbf{A}\bar{\mathbf{u}}| \ \ ||\bar{\mathbf{u}}|| \leq 1\}$
- $S = \{\mathbf{A} + \bar{\mathbf{x}}_c\bar{\mathbf{u}}^T| \ \ ||\bar{\mathbf{u}}|| \leq 1\}$
- $S = \{\bar{\mathbf{x}}_c + \bar{\mathbf{u}}| \ \ ||\bar{\mathbf{u}}|| \leq 1\}$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$S = \{\bar{\mathbf{x}}_c + \mathbf{A}\bar{\mathbf{u}}| \ \ ||\bar{\mathbf{u}}|| \leq 1\}$

6) In multi-antenna beamforming, all the beamforming vectors that ensure unity gain for the desired signal lie in a *1 point*

- Hyperplane
- Halfspace
- Ellipsoid

Norm Cone

No, the answer is incorrect.
Score: 0

Accepted Answers:
Hyperplane

7) In wireless applications, the true channel vector corresponding to estimated CSI can be modeled to lie in a ***1 point***

- Hyperplane
- Halfspace
- Ellipsoid
- Norm Cone

No, the answer is incorrect.
Score: 0

Accepted Answers:
Ellipsoid

8) Consider the vector $\bar{\mathbf{x}} = [x_1 \quad x_2 \quad \cdots \quad x_n]^T$. The norm cone can be represented as the set of vectors ***1 point***

- $\|\bar{\mathbf{x}}\| \leq r$
- $\|\mathbf{A}\bar{\mathbf{x}}\| \leq r$
- $\bar{\mathbf{a}}^T\bar{\mathbf{x}} \leq r$
- $\left\|[x_1 \quad x_2 \quad \cdots \quad x_{n-1}]^T\right\| \leq x_n$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$\left\|[x_1 \quad x_2 \quad \cdots \quad x_{n-1}]^T\right\| \leq x_n$

9) A polyhedron is ***1 point***

- Intersection of hyperplanes only
- Intersection of hyperplanes and halfspaces
- Intersection of halfspace with an ellipsoid
- Intersection of a hyperplane with a norm cone

No, the answer is incorrect.
Score: 0

Accepted Answers:
Intersection of hyperplanes and halfspaces

10) Consider two $n-$ dimensional points $\bar{\mathbf{a}}$, $\bar{\mathbf{b}}$ and the set of points closer to $\bar{\mathbf{a}}$ than $\bar{\mathbf{b}}$ i.e $\{\bar{\mathbf{x}} | \ \|\bar{\mathbf{x}} - \bar{\mathbf{a}}\| \leq \|\bar{\mathbf{x}} - \bar{\mathbf{b}}\|\}$. This set is ***1 point***

- Concave
- Halfspace

Hyperplane

Ellipsoid

No, the answer is incorrect.
Score: 0

Accepted Answers:
Halfspace

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