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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 1 - How to access the portal

Course outline

How to access the portal

- How to access the home page?
- : How to access the course page?
- How to access the MCQ, MSQ and Programming assignments?
- Quiz : Assignment-0

Week 1 :
Introduction to properties of Vectors, Norms, Positive Semi-Definite matrices and Gaussian Random Vectors

DOWNLOAD VIDEOS

Week 2:
Introduction to Convex Optimization – Convex sets, Hyperplanes/ Half-spaces etc.

Assignment-0

The due date for submitting this assignment has passed.

As per our records you have not submitted this assignment. **Due on 2018-07-29, 23:59 IST.**

1) The optimal value of an objective (or cost) function is **1 point**

- The minimum or maximum value of objective function
- Can only be obtained if the objective function is differentiable
- Any point where is derivative of the cost function equals 0
- Any region where the cost function is increasing

No, the answer is incorrect.

Score: 0

Accepted Answers:

The minimum or maximum value of objective function

2) Principles of optimization can be employed in **1 point**

- Wireless Communication
- Signal Processing
- Machine Learning
- All of the above

No, the answer is incorrect.

Score: 0

Accepted Answers:

All of the above

3) Consider the vector $\bar{\mathbf{x}} = [x_1, x_2, \dots, x_n]^T$. The unit-norm vector along the same direction as $\bar{\mathbf{x}}$ is **1 point**

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A project of



In association with



Funded by

Convex/
Concave
Functions,
Examples,
Conditions for
Convexity.
Application:
Beamforming in
Wireless
Systems,
Multi-User
Wireless,
Cognitive Radio
Systems

ce De

$\frac{\bar{x}}{\|\bar{x}\|^2}$

$\frac{\|\bar{x}\|}{\bar{x}}$

No, the answer is incorrect.
Score: 0

Accepted Answers:
 $\frac{\bar{x}}{\|\bar{x}\|}$

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

4) An example of a convex function is

1 point

- e^x
- e^{-x}
- $x \ln x$
- All of the above

No, the answer is incorrect.
Score: 0

Accepted Answers:
All of the above

Week 5:
Jensen's
Inequality,
Operations that
preserve
Convexity,
Examples, Beamforming
in Multi-antenna
Wireless
Communication

5) The optimal value of the optimization problem $\min x \ln x, x \geq 0$ is

1 point

- 1
- 0
- e
- $-\frac{1}{e}$

No, the answer is incorrect.
Score: 0

Accepted Answers:
 $-\frac{1}{e}$

Week-6: Maximal
Ratio Combiner
(MRC), Multi-
antenna
Beamforming
with Interfering
User,
Zero-Forcing
(ZF)
beamforming, Robust
beamformer
Design

6) The eigenvalues of the matrix $\begin{bmatrix} 1 & 1 \\ 1 & -1 \end{bmatrix}$ are

1 point

- $1, -1$
- $2, -2$
- $\sqrt{2}, -\sqrt{2}$
- $1, 0$

Week-7: Optimization
for signal
estimation, LS,
WLS,
Regularization.
Application:
Wireless
channel
estimation,
Image
Reconstruction-
Deblurring, Representatic
of Convex
Optimization
problem

Week 8 :
Application:
Convex
optimization for

Machine Learning, Principal Component Analysis (PCA), Support Vector Machines

Week 9- Application: Compressive Sensing, Sparse Signal Processing, OMP (Orthogonal Matching Pursuit), LASSO (Least Absolute Shrinkage and Selection Operator) for signal estimation, SVM

Week 10- Application: Compressive Sensing, Sparse Signal Processing, OMP (Orthogonal Matching Pursuit), LASSO (Least Absolute Shrinkage and Selection Operator) for signal estimation

Week 11 : Application: 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

No, the answer is incorrect.

Score: 0

Accepted Answers:

$$\sqrt{2}, -\sqrt{2}$$

7) The probability density function of the Gaussian random variable X with mean $\mu = 4$ and variance $\sigma^2 = 10$ is

1 point

$$\frac{1}{\sqrt{200\pi}} e^{-\frac{(x-4)^2}{200}}, -\infty < x < \infty$$

$$\frac{1}{\sqrt{10\pi}} e^{-\frac{(x-4)}{10}}, 0 \leq x < \infty$$

$$\frac{1}{\sqrt{20\pi}} e^{-\frac{(x-4)^2}{20}}, -\infty < x < \infty$$

$$\frac{1}{\sqrt{20\pi}} e^{-\frac{|x-4|}{20}}, -\infty < x < \infty$$

No, the answer is incorrect.

Score: 0

Accepted Answers:

$$\frac{1}{\sqrt{20\pi}} e^{-\frac{(x-4)^2}{20}}, -\infty < x < \infty$$

8) The standard l_2 norm of a possibly complex vector $\bar{\mathbf{x}} = [x_1, x_2, \dots, x_n]^T$ is defined as

1 point

$$x_1 + x_2 + \dots + x_n$$

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

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

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

No, the answer is incorrect.

Score: 0

Accepted Answers:

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

9) Given a possibly complex vector $\bar{\mathbf{x}} = [x_1, x_2, \dots, x_n]^T$, the l_2 norm square denoted by $\|\bar{\mathbf{x}}\|^2$ equals

1 point

$$\bar{\mathbf{x}}\bar{\mathbf{x}}^H$$

$$\bar{\mathbf{x}}^H\bar{\mathbf{x}}$$

$$\bar{\mathbf{x}}^T\bar{\mathbf{x}}$$



$$|\bar{\mathbf{x}}|^2$$

No, the answer is incorrect.

Score: 0

Accepted Answers:

$$\bar{\mathbf{x}}^H \bar{\mathbf{x}}$$

10) Consider two real vectors $\bar{\mathbf{x}} = [x_1, x_2, \dots, x_n]^T$, $\bar{\mathbf{y}} = [y_1, y_2, \dots, y_n]^T$. Their dot **1 point** product is given as



$$\bar{\mathbf{x}} \bar{\mathbf{y}}^T$$



$$\bar{\mathbf{x}}^T \bar{\mathbf{y}}$$



$$|\bar{\mathbf{x}}^T \bar{\mathbf{y}}|$$



$$\|\bar{\mathbf{x}}\|^2 \|\bar{\mathbf{y}}\|^2$$

No, the answer is incorrect.

Score: 0

Accepted Answers:

$$\bar{\mathbf{x}}^T \bar{\mathbf{y}}$$

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