

Course outline

How does an NPTEL online course work?

Week-0

Week-1

Week-2

Lec 06- Matrix: Determinant, Inverse Computation, Adjoint, Cofactor Concepts

Lec 07- Applications of Matrices: Solution of System of Linear equations, MIMO Wireless Technology

Lec 08- Applications of Matrices: Electric Circuits, Traffic flows

Lec 09- Applications of Matrices: Graph Theory, Social Networks, Dominance Directed Graph, Influential Node

Lec 10- Null Space of Matrix: Definition, Rank-Nullity Theorem, Application in Electric Circuits

 Quiz : Assignment-2

 Feedback For Week 2

 Solution-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-2

The due date for submitting this assignment has passed.

Due on 2021-02-07, 23:59 IST.

As per our records you have not submitted this assignment.

 1) Beamforming is a technique that can be used in 1 point

- Machine Learning
- Wireless systems
- Data Analytics
- Medical technology

No, the answer is incorrect.

Score: 0

Accepted Answers:

Wireless systems

 2) Consider a multiple receive antenna wireless system with channel vector below 1 point

$$\bar{\mathbf{h}} = \begin{bmatrix} \frac{1}{\sqrt{2}} - j\frac{1}{\sqrt{2}} \\ -\frac{1}{\sqrt{2}} - j\frac{1}{\sqrt{2}} \end{bmatrix}$$

The Maximal Ratio Combiner (MRC) for this system, as defined in the lectures, is given as

$\begin{bmatrix} \frac{1}{2} + j\frac{1}{2} \\ -\frac{1}{2} + j\frac{1}{2} \end{bmatrix}$

$\begin{bmatrix} -\frac{1}{2} - j\frac{1}{2} \\ \frac{1}{2} - j\frac{1}{2} \end{bmatrix}$

$\begin{bmatrix} \frac{1}{\sqrt{2}} + j\frac{1}{\sqrt{2}} \\ -\frac{1}{\sqrt{2}} + j\frac{1}{\sqrt{2}} \end{bmatrix}$

$\begin{bmatrix} \frac{1}{2} - j\frac{1}{2} \\ -\frac{1}{2} - j\frac{1}{2} \end{bmatrix}$

No, the answer is incorrect.

Score: 0

Accepted Answers:

$\begin{bmatrix} \frac{1}{2} - j\frac{1}{2} \\ -\frac{1}{2} - j\frac{1}{2} \end{bmatrix}$

 3) Two matrices \mathbf{A} of size $m \times n$ and \mathbf{B} of size $p \times q$ can be multiplied to form the product \mathbf{AB} 1 point

- only when $m = p$ and $n = q$
- only when $n = p$, and arbitrary values of m, q
- only when $m = q$, and arbitrary values of n, p
- For any values of m, n, p, q

No, the answer is incorrect.

Score: 0

Accepted Answers:

 only when $n = p$, and arbitrary values of m, q

 4) Vectors $\bar{\mathbf{a}}_1, \bar{\mathbf{a}}_2, \dots, \bar{\mathbf{a}}_n$ are linearly independent when 1 point

- $\alpha_1 \bar{\mathbf{a}}_1 + \alpha_2 \bar{\mathbf{a}}_2 + \dots + \alpha_n \bar{\mathbf{a}}_n = 0 \Leftrightarrow \alpha_1 = \alpha_2 = \dots = 0$
- $\alpha_1 = \alpha_2 = \dots = 0 \Rightarrow \alpha_1 \bar{\mathbf{a}}_1 + \alpha_2 \bar{\mathbf{a}}_2 + \dots + \alpha_n \bar{\mathbf{a}}_n = 0$
- There exist $\alpha_1, \alpha_2, \dots, \alpha_n$, not all zero, such that $\alpha_1 \bar{\mathbf{a}}_1 + \alpha_2 \bar{\mathbf{a}}_2 + \dots + \alpha_n \bar{\mathbf{a}}_n = 0$
- There exist $\alpha_1, \alpha_2, \dots, \alpha_n$, not all zero, such that $\alpha_1 \bar{\mathbf{a}}_1 + \alpha_2 \bar{\mathbf{a}}_2 + \dots + \alpha_n \bar{\mathbf{a}}_n \neq 0$

No, the answer is incorrect.

Score: 0

Accepted Answers:

 $\alpha_1 \bar{\mathbf{a}}_1 + \alpha_2 \bar{\mathbf{a}}_2 + \dots + \alpha_n \bar{\mathbf{a}}_n = 0 \Leftrightarrow \alpha_1 = \alpha_2 = \dots = 0$

 5) The rank of a matrix is 1 point

- The minimum number of linearly independent columns
- The maximum number of linearly dependent columns
- The maximum number of linearly independent columns
- The minimum number of linearly dependent columns

No, the answer is incorrect.

Score: 0

Accepted Answers:

The maximum number of linearly independent columns

 6) The rank of the matrix \mathbf{A} given below is 1 point

$$\mathbf{A} = \begin{bmatrix} -2 & 1 & -3 \\ -1 & 5 & 7 \\ -3 & -3 & -13 \end{bmatrix}$$

- 0
- 1
- 2
- 3

No, the answer is incorrect.

Score: 0

Accepted Answers:

2

 7) Which of the following conditions imply that matrix \mathbf{A} of size $n \times n$ is invertible 1 point

- only $\text{rank}(\mathbf{A}) = n$
- only $\det(\mathbf{A}) \neq 0$
- only $\mathbf{A}\bar{\mathbf{x}} = 0 \Leftrightarrow \bar{\mathbf{x}} = 0$
- All of these

No, the answer is incorrect.

Score: 0

Accepted Answers:

All of these

 8) Matrix that is NOT invertible is termed a 1 point

- Singular matrix
- Poor matrix
- Linearly independent matrix
- Orthogonal matrix

No, the answer is incorrect.

Score: 0

Accepted Answers:

Singular matrix

 9) Let \mathbf{C} denote the matrix of cofactors for \mathbf{A} . Then, the adjoint of \mathbf{A} , denoted by $\text{adj}(\mathbf{A})$, is given as 1 point

- \mathbf{C}^T
- $-\mathbf{C}$
- $\frac{\mathbf{C}}{|\mathbf{C}|}$
- \mathbf{C}^{-1}

No, the answer is incorrect.

Score: 0

Accepted Answers:

 \mathbf{C}^T

 10) Consider the $r \times t$ MIMO channel matrix \mathbf{H} . The (i, j) element of \mathbf{H} , represented by $h_{i,j}$, denotes the channel between 1 point

- Receive antenna j and transmit antenna i
- Frequency band j and transmit antenna i
- Receive antenna j and frequency band i
- Receive antenna i and transmit antenna j

No, the answer is incorrect.

Score: 0

Accepted Answers:

 Receive antenna i and transmit antenna j