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## Unit 6 - Week 5 : unit 5

### Course outline

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Lecture 21 : Left and right inverse of a matrix

Lecture 22 : Orthogonality between the subspaces

Lecture 23 : Best estimate

Lecture 24 : Projection operation and linear transformation

Lecture 25 : Creating orthogonal basis vectors

Lecture Materials

Quiz : Week 5 Assignment 5

### Week 5 Assignment 5

The due date for submitting this assignment has passed.

As per our records you have not submitted this assignment. **Due on 2018-09-12, 23:59 IST.**

- 1)  $Ax = b$  has infinite solution. Then **1 point**
- $A$  has a left inverse but no right inverse.
  - $A$  has a right inverse but no left inverse.
  - $A$  is invertible.
  - $A$  has dependent rows.

- a)  
 b)  
 c)  
 d)

**No, the answer is incorrect.**

**Score: 0**

**Accepted Answers:**

b)

- 2)  $A_{5 \times 3}$  has two independent columns. Then the dimension of null space is **1 point**
- 1
  - 2
  - 3
  - 5

- a)  
 b)  
 c)  
 d)

**No, the answer is incorrect.**

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$A_{5 \times 3}$  has two independent column. The dimension of left null space is

- a) 1
- b) 2
- c) 3
- d) 5

- a)
- b)
- c)
- d)

No, the answer is incorrect.

Score: 0

Accepted Answers:

c)

4) Check whether  $a=(1,0,0)$  and  $b=(0,5,2)$  are orthogonal 1 point

- a) Yes as  $a$  and  $b$  are linearly independent.
- b) Yes as  $ab=0$
- c) No as  $ab \neq 0$
- d) No as  $a \times b \neq 0$

- a)
- b)
- c)
- d)

No, the answer is incorrect.

Score: 0

Accepted Answers:

b)

5) If  $Ax=b$  has a solution and  $y$  is in the left null space of  $A$  then 1 point

- a)  $b^T y = 0$
- b)  $b = cy$
- c)  $ab + cy = 0$  where  $a, c \neq 0$
- d) None of the above

- a)
- b)
- c)
- d)

No, the answer is incorrect.

Score: 0

Accepted Answers:

a)

6)

1 point

Find best estimate for  $\begin{bmatrix} 1 & 3 \\ 1 & 4 \\ 0 & 0 \end{bmatrix} \begin{Bmatrix} x_1 \\ x_2 \end{Bmatrix} = \begin{Bmatrix} 4 \\ 5 \\ 7 \end{Bmatrix}$

- a)  $\begin{Bmatrix} 1 \\ 0 \end{Bmatrix}$   
 b)  $\begin{Bmatrix} 1 \\ 1 \end{Bmatrix}$   
 c)  $\begin{Bmatrix} 2 \\ 1 \end{Bmatrix}$   
 d) Cannot be found

- a)  
 b)  
 c)  
 d)

No, the answer is incorrect.

Score: 0

Accepted Answers:

b)

7)

0 points

$\vec{a}$  and  $\vec{b}$  are orthogonal then which one is not true

- a)  $c\vec{a} + d\vec{b} = 0$  where  $c, d = 0$   
 b)  $\vec{b}^T \cdot \vec{a} = 0$   
 c)  $\vec{b}$  and  $\vec{a}$  both belong to some  $R^n$   
 d)  $\|\vec{a}\| + \|\vec{b}\| < \|\vec{a} + \vec{b}\|$

- a)  
 b)  
 c)  
 d)

No, the answer is incorrect.

Score: 0

Accepted Answers:

d)

8)

Which one is not an orthogonal matrix

- a) Identity matrix  
 b) Permutation matrix  
 c) Projection matrix  
 d) Rotation matrix

- a)

1 point

- b)  
 c)  
 d)

No, the answer is incorrect.

Score: 0

Accepted Answers:

c)

9)

An orthogonal matrix is given as  $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$  then  $A^{-1}$  equals to

1 point

- a)  $\begin{bmatrix} a & c \\ b & d \end{bmatrix}$   
b)  $\frac{1}{ab} \begin{bmatrix} ac & -bd \\ d & b \end{bmatrix}$   
c)  $\frac{1}{ab} \begin{bmatrix} a+b & b+d \\ c+d & d+a \end{bmatrix}$   
d)  $\begin{bmatrix} c & d \\ a & b \end{bmatrix}$

- a)  
 b)  
 c)  
 d)

No, the answer is incorrect.

Score: 0

Accepted Answers:

a)

10

If  $a = \begin{Bmatrix} 1 \\ 2 \end{Bmatrix}$  and  $b = \begin{Bmatrix} -3 \\ 4 \end{Bmatrix}$  then find the component of  $a$  along  $b$

0 points

- a)  $\begin{Bmatrix} -1 \\ 2 \end{Bmatrix}$   
b)  $\begin{Bmatrix} 1 \\ 2 \end{Bmatrix}$   
c)  $\begin{Bmatrix} -3 \\ 4 \end{Bmatrix}$   
d)  $\frac{1}{\sqrt{5}} \begin{Bmatrix} -3 \\ 4 \end{Bmatrix}$

- a)  
 b)  
 c)  
 d)

No, the answer is incorrect.

Score: 0

Accepted Answers:

c)

