

Sultan Qaboos University-College of Science
Department of Mathematics and Statistics
MATH 2202 - Linear Algebra I
Spring Semester 2009 - Quiz 1 (Version A)

Date: 23rd February 2009

Time Allowed: 20 mins.

NAME

ID NO.

1. [3 marks] Find the general solution of the linear system whose augmented matrix is equivalent to the matrix

$$A = \begin{bmatrix} 1 & 2 & -5 & -6 & 0 & -5 \\ 0 & 1 & -6 & -3 & 0 & 2 \\ 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

2. [4 marks] Mark the following statement **True** or **False** and justify.

- (a) The weights c_1, \dots, c_p in a linear combination $c_1 \mathbf{v}_1 + \dots + c_p \mathbf{v}_p$ cannot all be zero.
(b) The linear system corresponding to the augmented matrix $[\mathbf{a}_1 \ \mathbf{a}_2 \ \mathbf{a}_3 \ \mathbf{b}]$ has a solution if \mathbf{b} is in $\text{Span}\{\mathbf{a}_1, \mathbf{a}_2, \mathbf{a}_3\}$.

3. [3 marks] The vectors $\mathbf{v}_1 = \begin{bmatrix} 6 \\ 1 \\ 0 \end{bmatrix}$, $\mathbf{v}_2 = \begin{bmatrix} 3 \\ 1 \\ 3 \end{bmatrix}$, and $\mathbf{v}_3 = \begin{bmatrix} 7 \\ 2 \\ 5 \end{bmatrix}$ satisfy:

$-\mathbf{v}_1 - 5\mathbf{v}_2 + 3\mathbf{v}_3 = \mathbf{0}$. Use this fact (and no row elimination) to find x_2 and x_3 that satisfy the matrix equation $[\mathbf{v}_2 \ \mathbf{v}_3] \begin{bmatrix} x_2 \\ x_3 \end{bmatrix} = \mathbf{v}_1$.

Answers

Sultan Qaboos University-College of Science
Department of Mathematics and Statistics
MATH 2202 - Linear Algebra I
Spring Semester 2009 - Quiz 2 (Version A)

Date: 23rd March 2009
NAME

Time Allowed: 20 mins.
ID NO.

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1. [3 marks] Let A, B be two matrices of size $m \times n$ and $n \times p$, respectively. Show that if the columns of the matrix B are linearly independent, then so are the columns of AB .
 2. [3 marks] Suppose A, B , and X are $n \times n$ matrices with A, X , and $A - AX$ invertible. If $(A - AX)^{-1} = X^{-1}B$, explain why B is invertible and solve for X .
 3. [4 marks] Let $A = \begin{bmatrix} 1 & 2 \\ 1 & 3 \\ 1 & 5 \end{bmatrix}$. Construct a 2×3 matrix C using only 1, -1, and 0 as entries such that $CA = I_2$. Compute AC and note that $AC \neq I_3$.

Answers

Sultan Qaboos University-College of Science
Department of Mathematics and Statistics
MATH 2202 - Linear Algebra I
Spring Semester 2009 - Quiz 3 (Version A)

Date: 6th April 2009
NAME

Time Allowed: 20 mins.
ID NO.

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1. [3 marks] Let A and B be two matrices of size $m \times n$ and $n \times p$, respectively. Show that if the columns of the matrix B are linearly independent, then so are the columns of AB .
 2. [3 marks] Suppose A, B , and X are $n \times n$ matrices with A, X , and $A - AX$ invertible. If $(A - AX)^{-1} = X^{-1}B$, explain why B is invertible and solve for X .
 3. [4 marks] Let $A = \begin{bmatrix} 1 & 2 \\ 1 & 3 \\ 1 & 5 \end{bmatrix}$. Construct a 2×3 matrix C using only 1, -1 , and 0 as entries such that $CA = I_2$. Compute AC and note that $AC \neq I_3$.

Answers

Sultan Qaboos University-College of Science
Department of Mathematics and Statistics
MATH 2202 - Linear Algebra I
Spring Semester 2009 - Quiz 3 (Version A)

Date: 4th May 2009
NAME

Time Allowed: 20 mins.
ID NO.

1. Determine the values of the parameter s for which the system

$$\begin{cases} 2sx_1 + x_2 = 1 \\ 3sx_1 + 6sx_2 = 2 \end{cases}$$

has a unique solution and use Cramer's rule to describe the solution.

2. Determine if the set H of all matrices of the form $\begin{bmatrix} a & b \\ 0 & d \end{bmatrix}$ is a subspace of $M_{2 \times 2}$.
3. Given two vector spaces V and W , let $T : V \longrightarrow W$ be a linear transformation. Show that if U is a subspace of V , then $T(U)$ is a subspace of W .
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Answers