Name SOLUTION

Mathematics 1553

Quiz 5

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1. Find the inverse of the matrix

$$A = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 1 \\ 2 & 0 & 1 \end{pmatrix}$$

$$\left(\begin{array}{ccc|ccc} 1 & 0 & 0 & 1 & 0 & 0 \\ 0 & 1 & 1 & 0 & 1 & 0 \\ 2 & 0 & 1 & 0 & 0 & 1 \end{array}\right) \rightsquigarrow \left(\begin{array}{ccc|ccc} 1 & 0 & 0 & 1 & 0 & 0 \\ 0 & 1 & 1 & 0 & 1 & 0 \\ 0 & 0 & 1 & -2 & 0 & 1 \end{array}\right)$$

$$\rightsquigarrow \left(\begin{array}{ccc|ccc} 1 & 0 & 0 & 1 & 0 & 0 \\ 0 & 1 & 0 & 2 & 1 & -1 \\ 0 & 0 & 1 & -2 & 0 & 1 \end{array}\right) \qquad A^{-1} = \begin{pmatrix} 1 & 0 & 0 \\ 2 & 1 & -1 \\ -2 & 0 & 1 \end{pmatrix}$$

Use your answer from the first part to solve the matrix equation

$$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 1 \\ 2 & 0 & 1 \end{pmatrix} \begin{pmatrix} x_1 \\ x_2 \\ x_3 \end{pmatrix} = \begin{pmatrix} 2 \\ 2 \\ 3 \end{pmatrix}$$

$$\begin{pmatrix} 1 & 0 & 0 \\ 2 & 1 & -1 \\ -2 & 0 & 1 \end{pmatrix} \begin{pmatrix} 2 \\ 2 \\ 3 \end{pmatrix} = \begin{pmatrix} 2 \\ 3 \\ -1 \end{pmatrix}$$

Turn the page over!

2. Suppose that A is an $n \times n$ invertible matrix. Select TRUE if the statement is definitely true and FALSE otherwise.

$Ax = 0$ has multiple solutions.

TRUE FALSE

The rows of A are linearly independent.

TRUE FALSE

The reduced row echelon form of A is the identity.

TRUE FALSE

The linear transformation $T(v) = Av$ is one-to-one, onto, and invertible.

TRUE FALSE

If $T(v) = Av$ then the matrix for $T \circ T$ is A^2.

TRUE FALSE