Math 321

Linear Algebra

February 3, 2006 Quiz 2 Spring 2006

Name: Key (blue)

1. Consider the matrix

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

and the vector

$$X = \begin{pmatrix} 1 \\ 0 \\ 1 \end{pmatrix}.$$

Compute AX.

$$\begin{pmatrix} 1 & 3 & -1 \\ 2 & 2 & 3 \end{pmatrix}\begin{pmatrix} 1 \\ 0 \\ 1 \end{pmatrix} = \begin{pmatrix} 0 \\ 5 \end{pmatrix}$$

2. Let A be a vector in $\mathbb{R}^n$. Suppose that both $X, Y \in \mathbb{R}^n$ satisfy the equation

$(*)$ $\quad A \cdot X = 0,$

that is $A \cdot Y = 0$ also. Show that $X - 2Y$ is also a solution to $(*)$.

$$A\cdot(X-2Y) = A\cdot X + A\cdot(-2Y) = A\cdot X - 2A\cdot Y = 0$$

($A\cdot X = 0$, $A\cdot Y = 0$)

$\Rightarrow$ $X-2Y$ is a solution to $(*)$

Math 321

Linear Algebra

February 3, 2006 Quiz 2 Spring 2006

Name: Key (white)

1. Let A be a vector in $\mathbb{R}^n$. Suppose that both $X, Y \in \mathbb{R}^n$ satisfy the equation

$(*)$ $\quad A \cdot X = 0,$

that is $A \cdot Y = 0$ also. Show that $2X - Y$ is also a solution to $(*)$.

$$A\cdot(2X-Y) = A\cdot(2X) + A\cdot(-Y) = 2A\cdot X - A\cdot Y = 0$$

$$\Rightarrow 2X-Y \text{ is a solution to } (*).$$

2. Consider the matrix

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

and the vector

$$X = \begin{pmatrix} 1 \\ 1 \\ 0 \end{pmatrix}.$$

Compute AX.

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