110.201 Linear Algebra
2nd Quiz

February 10, 2005

Problem 1 Consider the vector $\vec{v} = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$ in $\mathbb{R}^3$

1. Determine the equation of the plane V through the origin and orthogonal to $\vec{v}$.
2. Consider the vector $\vec{w} = \begin{bmatrix} 4 \\ 5 \\ 6 \end{bmatrix}$ in $\mathbb{R}^3$ and find $ref_V(\vec{w})$.

Problem 2 Is the following matrix invertible?

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

Justify your answer. If A^{-1} exists, find it.

Problem 3^* Define the linear transformation $T_A : \mathbb{R}^3 \to \mathbb{R}^3$ (i.e. write the matrix A) whose kernel $\mathrm{Ker}(T_A)$ is the line through the origin and parallel to the vector $\begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix}$ and whose image $\mathrm{Image}(T_A)$ is the plane $x + z = 0$. Justify your answer.