Math 54 Summer 2006

Practice Midterm 1

1. *Let* $v_1 = (-1, 1, 1), v_2 = (1, 2, -2)$. *Find the vector* u *that has the same direction as* v_1 *and same length as* v_2.

2. *Find the inverse of* $\begin{pmatrix} 1 & 0 & 1 \\ 0 & 1 & 1 \\ 2 & 3 & 4 \end{pmatrix}$.

3. *Let* V *be the subspace of* M_{23} *consisting of all matrices* A *that satisfy the condition* $A \begin{bmatrix} 1 \\ 2 \\ -1 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix}$. *Find a basis for* V.

4. *Let* V *be the subset of* $C[0, 1]$ *consisting of all functions* f *that have the property*

$$f^2(x) = f(x) \text{ for all } x \in [0, 1].$$

   Is V *a vector space if addition and scalar multiplication are the standard ones?*

5. *Are the following statements true or false? Give a brief reason or counterexample for each.*

   a. *If* A *is a* 3×4 *matrix then the rows of* A *are linearly independent.*

   b. *If* A *is a* 3×3 *matrix and the rows of* A *are linearly dependent then the columns of* A *are linearly dependent too.*