MATH 221, Spring 2010.(50 minute exam)

Name ____________________

ID ____________________

1. Write the last 2 digits of your student ID in the blank space in the vector w.

$$\text{Let } \overline{v} = \begin{bmatrix} 2 \\ 0 \\ -1 \end{bmatrix}, \ \overline{u} = \begin{bmatrix} 2 \\ 0 \\ 1 \end{bmatrix} \text{ and } w = \begin{bmatrix} 4 \\ .... \\ 2 \end{bmatrix}.$$

(a) Does w belong to $span\{u, v\}$? Justify.

(b) Does u belong to $span\{v, w\}$? Justify.

2. Write the last 2 digits of your ID in the blank space in the vector v_1.

$$v_1 = \begin{bmatrix} 1 \\ -1 \\ \ldots \end{bmatrix}, v_2 = \begin{bmatrix} 0 \\ 0 \\ h+2 \end{bmatrix}, v_3 = \begin{bmatrix} 0 \\ h \\ 6 \end{bmatrix}.$$

Find all values of h for which the vectors are *linearly independent.*

3. Let $S = \left\{ \begin{bmatrix} a & b \\ 0 & c \end{bmatrix} : a, b, c \text{ are real numbers and } a = (\lambda + 1)bc \right\}$ where λ is the last 2 digits of your ID. Is S a subspace of $R^{2\times 2}$?

4. Let $S = \{(a, (\lambda + 1)a, b) : a, b \text{ are real numbers}\}$ where λ is the last 2 digits of your ID.

(a) i. Is S a subspace of R^3?

ii. If S is a subspace find a basis for S.

(b) Let $M_1 = \begin{bmatrix} 1 & 0 \\ 0 & 0 \end{bmatrix}$, $M_2 = \begin{bmatrix} 0 & 0 \\ 1 & 0 \end{bmatrix}$ and $M_3 = \begin{bmatrix} 1 & 0 \\ (\lambda + 1) & 0 \end{bmatrix}$ where λ is the last two digits of your student ID. If $S = span\{M_1, M_2, M_3\}$ find a basis for S.

5. Write the last 2 digits of your student ID in the blank space in the vector u where $\overline{v} = \begin{bmatrix} 1 \\ 0 \end{bmatrix}$ and $\overline{u} = \begin{bmatrix} 2 \\ ... \end{bmatrix}$. Is $\{\overline{v}, \overline{u}\}$ a basis for R^2?