QUIZ #4, 9/6/07

MATH 54, FALL 2007

Show your work and justify your answers! Feel free to use both sides.

Name:

1. Find the inverse of $\begin{bmatrix} 2 & 1 \\ 2 & 2 \end{bmatrix}$.

$$\left[\begin{array}{cc|c} 2 & 1 & y_1 \\ 2 & 2 & y_2 \end{array}\right] \leftrightarrow \left[\begin{array}{cc|c} 1 & \frac{1}{2} & \frac{y_1}{2} \\ 2 & 2 & y_2 \end{array}\right] \leftrightarrow$$
$$\left[\begin{array}{cc|c} 1 & \frac{1}{2} & \frac{y_1}{2} \\ 0 & 1 & y_2 - y_1 \end{array}\right] \leftrightarrow \left[\begin{array}{cc|c} 1 & 0 & y_1 - \frac{y_2}{2} \\ 0 & 1 & y_2 - y_1 \end{array}\right]$$

Thus the inverse is $\begin{bmatrix} 1 & -\frac{1}{2} \\ -1 & 1 \end{bmatrix}$.

2. For each of the following transformations from $\mathbb{R}^2$ to itself, state (you needn't justify your answers here) whether it is linear or not. **If it is linear, write down its matrix.**

(a) $y_1 = x_1$ and $y_2 = 4x_2 - 8x_1$

Yes. $\begin{bmatrix} 1 & 0 \\ -8 & 4 \end{bmatrix}$

(b) $y_1 = e^{x_1}$ and $y_2 = e^{x_2}$

No.

(c) $y_1 = 3$ and $y_2 = x_1$

No.

(d) $y_1 = 6x_1 \cdot x_2$ and $y_2 = 2x_2$

No.