Name:

Linear Algebra: Quiz 4

Show ALL work, as unjustified answers may receive no credit. Calculators are not allowed on any quiz or test paper. Make sure to exhibit skills discussed in class. Box all answers and clean up answers as much as possible.

1. [4pts] Assume that T is a Linear Transformation. Find the Standard Matrix of T:

$$T\colon \mathbb{R}^2 \to \mathbb{R}^2 \ first\ performs\ a\ vertical\ shear\ that\ transforms\ \overrightarrow{e_1}\ to\ \overrightarrow{e_1} - 2\overrightarrow{e_2}$$
$$(leaving\ \overrightarrow{e_2}\ unchanged), and\ then\ reflects\ points\ through\ the\ line\ x_2 = -x_1$$

2. Define a Linear Transformation $T\colon \mathbb{R}^3 \to \mathbb{R}^3$ such that:

$$\begin{bmatrix} x_1 \\ x_2 \end{bmatrix} \mapsto \begin{bmatrix} x_1 - x_2 \\ -x_1 + 2x_2 \\ x_1 + x_2 \end{bmatrix}$$

(a) [2pts] Find the Standard Matrix of T.

(b) [2pts] Is T one-to-one? Explain.

(c) [2pts] Is T onto? Explain.