Math 205
Quiz #7

1. Suppose $T : \mathbb{R}^2 \mapsto \mathbb{R}^2$ is a linear transformation so that

$$T\begin{bmatrix}1\\0\end{bmatrix} = \begin{bmatrix}2\\0\end{bmatrix} \text{ and } T\begin{bmatrix}-1\\1\end{bmatrix} = \begin{bmatrix}2\\3\end{bmatrix}.$$

(a) Find

$$T\begin{bmatrix}0\\1\end{bmatrix}.$$

$T\begin{bmatrix}0\\1\end{bmatrix} = T\left(\begin{bmatrix}1\\0\end{bmatrix} + \begin{bmatrix}-1\\1\end{bmatrix}\right) = T\left(\begin{bmatrix}1\\0\end{bmatrix}\right) + T\left(\begin{bmatrix}-1\\1\end{bmatrix}\right) = \begin{bmatrix}2\\0\end{bmatrix} + \begin{bmatrix}2\\3\end{bmatrix}$

$\Rightarrow T\begin{bmatrix}0\\1\end{bmatrix} = \begin{bmatrix}4\\3\end{bmatrix}$

(b) Find the matrix representation of T (with respect to the standard basis).

$\begin{bmatrix}2 & 4\\0 & 3\end{bmatrix}$.