Math 4377
March 6, 2019 Homework 6 Name _____

1. Find the change of coordinates matrix that changes β'-coordinates to β-coordinates.
   (a) $\beta = \{(1,1), (-1,1)\}$, and $\beta' = \{(2,1), (1,2)\}$.
   (b) $\beta = \{(1,0), (0,1)\}$, and $\beta' = \{(3,0), (0,3)\}$

2. Let $\mathbf{T}$ be the linear operator on $\mathbb{R}^2$ defined by

$$T\left(\begin{bmatrix} a \\ b \end{bmatrix}\right) = \begin{bmatrix} 3a+b \\ -a+2b \end{bmatrix}.$$

   Let β be the standard ordered basis for $\mathbb{R}^2$, and let

$$\beta' = \left\{\begin{bmatrix} 1 \\ 1 \end{bmatrix}, \begin{bmatrix} -1 \\ 1 \end{bmatrix}\right\}.$$

   Use Theorem 2.23 and the fact that

$$\begin{bmatrix} 1 & -1 \\ 1 & 1 \end{bmatrix}^{-1} = \frac{1}{2}\begin{bmatrix} 1 & 1 \\ -1 & 1 \end{bmatrix}$$

   to find $[\mathbf{T}]_{\beta'}$.