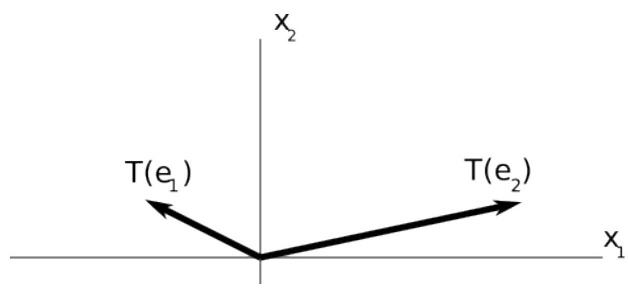
Worksheet 6

1, Lay: 1.9.13, 2.2.16, 3.1.9,3.2.5,3.2.32,3.2.35

1.9.13 Let $T : \mathbb{R}^2 \to \mathbb{R}^2$ be the linear transformation such that $T(\mathbf{e}_1)$ and $T(\mathbf{e}_2)$ are the vectors shown in the figure. Using the figure, sketch the vector $T(2,1)$.



2.2.16 Suppose A and B are $n \times n$ matrices, B is invertable, and AB is invertable. Show A is invertable. [Hint: Let $C = AB$, and solve this equation for A].

3.1.9 Compute by cofactor expansion the determinant of

$$\begin{vmatrix} 6 & 0 & 0 & 5 \\ 1 & 7 & 2 & -5 \\ 2 & 0 & 0 & 0 \\ 8 & 3 & 1 & 8 \end{vmatrix}.$$

3.2.5 Find by row reduction the determinant of

$$\begin{vmatrix} 1 & 5 & -6 \\ -1 & -4 & 4 \\ -2 & -7 & 9 \end{vmatrix}.$$

In other words, reduce this matrix to row echelon form and use the properties of how determinants transform under row operations.

3.2.32 Find a formula for $\det(rA)$ where A is an $n \times n$ matrix.

3.2.35 Let U be a square matrix such that $U^T U = I$. Show that $\det U = \pm 1$.

Suppose

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

and

$$B = \begin{bmatrix} 6 & 1 \\ 2 & 2 \end{bmatrix}.$$

Find

$$\det A^2 B^7 A^{-1}.$$