Week 4
MATH 4A
TA: Jerry Luo
jerryluo8@math.ucsb.edu
Website: math.ucsb.edu/∼jerryluo8
Office Hours: Monday 9:30-10:30AM, South Hall 6431X
Math Lab hours: Monday 3-5PM, South Hall 1607

4-2.3 Let $e_1 = (1, 0)$, $e_2 = (0, 1)$, $x_1 = (4, 5)$, and $x_2 = (-7, 5)$. Let $T : \mathbb{R}^2 \to \mathbb{R}^2$ be a linear transformation that sends $e_1 \mapsto x_2$ and $e_2 \mapsto x_2$. What is $T(-8, 3)$?

4-2.5 Let $v_1 = \begin{bmatrix} -1 \\ -2 \end{bmatrix}$ and $v_2 = \begin{bmatrix} 1 \\ 3 \end{bmatrix}$. Suppose $T(v_1) = \begin{bmatrix} -12 \\ 8 \end{bmatrix}$ and $T(v_2) = \begin{bmatrix} 19 \\ -9 \end{bmatrix}$. For an arbitrary vector $v = \begin{bmatrix} x \\ y \end{bmatrix}$, find $T(v)$.

4-2.7 Given $T : \mathbb{R}^2 \to \mathbb{R}^2$ such that $T\left(\begin{bmatrix} 1 \\ 0 \end{bmatrix}\right) = \begin{bmatrix} -1 \\ -1 \end{bmatrix}$ and $T\left(\begin{bmatrix} 0 \\ 1 \end{bmatrix}\right) = \begin{bmatrix} 1 \\ -3 \end{bmatrix}$. Find the matrix A of (ie. that represents) T.

1. Let $T : \mathbb{R}^r \to \mathbb{R}^s$. Determine whether or not T is onto in each of the following situations:

   (a) $r = s$

   (b) $r < s$

   (c) $r > s$