

Math 60
Homework 4

Name _____
Due Monday October 3 before 4:00 PM

1. Find a basis for the kernel of

$$A = \begin{bmatrix} 1 & 2 & 2 & 0 & -2 \\ 2 & 2 & 1 & 1 & -1 \\ 2 & 0 & 1 & 1 & -1 \\ 1 & 2 & -1 & 1 & 1 \end{bmatrix} \in M_{4,5}(\mathbb{R})$$

2. Find all solutions to the system of linear equations in \mathbb{R} :

$$\begin{array}{rccccrc} x & +2y & -z & +w & = & 1 \\ 2x & +y & +z & +w & = & 2 \\ -x & & -2z & -w & = & -1 \end{array}$$

3. Let $f : \mathbb{R}^3 \rightarrow \mathbb{R}^3$ be given by $f(x, y, z) = (2x + y, x + y + z, 2x + y + z)$. Is f a linear transformation? Explain.
4. Let $f : \mathbb{R}^2 \rightarrow \mathbb{R}^3$ be given by $f(x, y) = (x - y, x + y, -2x + y)$ and $g : \mathbb{R}^3 \rightarrow \mathbb{R}^2$ be given by $g(u, v, w) = (u - v + w, 2u + v - w)$. Find the matrices of f , g , $f \circ g$, and $g \circ f$.