

Math 205 Quiz 3

Name:

1. Consider the linear transformation $T(x_1, x_2, x_3) = (x_1 - 2x_2, x_1 + x_2 + x_3)$.

(a) What is the domain of T ?

(b) What is the codomain of T ?

(c) What is the image of $\vec{x} = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$?

(d) Determine the matrix A such that $T(\vec{x}) = A\vec{x}$.

(e) Is T one-to-one? Briefly explain.

(f) Is T onto? Briefly explain.

2. Provide a brief written answer to the following.

(a) The matrix equation $A\vec{x} = \vec{b}$ is inconsistent if and only if $\text{rref}([A \mid \vec{b}])$ _____

(b) What is the definition of the **span** of a set of vectors?

(c) If a set of vectors is **linearly dependent**, then what does that mean? NOT how can you tell, what does it mean?

(d) How can you tell if a set of vectors is **linearly dependent**?

(e) Give one statement that is equivalent to: "Let A be an $m \times n$ matrix. The matrix equation $A\vec{x} = \vec{b}$ has a solution for every \vec{b} in \mathbb{R}^m ."