

# Homework 4 MATH 304 Section 3

**Assigned:** Friday, September 12.

**Potentially Collected:** Friday, September 19.

1. Let  $\vec{u} = \begin{bmatrix} 2 \\ -1 \\ 4 \end{bmatrix}$  and  $\vec{v} = \begin{bmatrix} 1 \\ 2 \\ -3 \end{bmatrix}$ . Compute the following vectors:

a)  $\vec{u} + \vec{v}$ .

b)  $\vec{u} - \vec{v}$ .

c)  $\vec{0} - 3\vec{v}$ .

d)  $2\vec{u} - 3\vec{v}$ .

2. Which of the following functions are linear transformations?

a)  $F : \mathbb{R}^2 \rightarrow \mathbb{R}^3$  where

$$F \left( \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} \right) = \begin{bmatrix} x_1 + 1 \\ x_2 \\ x_1 + x_2 \end{bmatrix}$$

b)  $G : \mathbb{R}^2 \rightarrow \mathbb{R}^3$  where

$$G \left( \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} \right) = \begin{bmatrix} x_1 + x_2 \\ x_2 \\ x_1 - x_2 \end{bmatrix}$$

c)  $H : \mathbb{R}^3 \rightarrow \mathbb{R}^3$  where

$$H \left( \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} \right) = \begin{bmatrix} x_1 \\ x_2^2 + x_3^2 \\ x_3^2 \end{bmatrix}$$