

**Unity University**  
**Department of Computer Science**  
**Linear Algebra (Math 2022) Assignment I**

**General Instructions**

- Direct copy of the answer from each other worth's mark "0".
- Don't use black pen to write your answer.
- Each answer should be submitted with clear and neat hand writing.

1. Find the solution of the systems for the augmented matrix

a.  $\begin{bmatrix} 1 & -4 & 2 & 0 \\ -9 & 12 & -6 & 0 \\ -6 & 8 & -4 & 0 \end{bmatrix}$       b.  $\begin{bmatrix} 1 & -7 & 0 & 6 & 5 \\ 0 & 0 & 1 & -2 & -3 \\ -1 & 7 & -4 & 2 & 7 \\ 4 & 1 & 0 & -1 & 3 \end{bmatrix}$

2. For what values of h is  $v_1, v_2, v_3$  are linearly dependent

a.  $v_1 = \begin{bmatrix} 1 \\ -5 \\ -3 \end{bmatrix}, v_2 = \begin{bmatrix} -2 \\ 10 \\ 6 \end{bmatrix}, v_3 = \begin{bmatrix} 2 \\ -9 \\ h \end{bmatrix}$

b.  $v_1 = \begin{bmatrix} 1 \\ 5 \\ -3 \end{bmatrix}, v_2 = \begin{bmatrix} -2 \\ -9 \\ 6 \end{bmatrix}, v_3 = \begin{bmatrix} 2 \\ h \\ -9 \end{bmatrix}$

3. Let  $A = \begin{bmatrix} 5 & 0 & 0 \\ 0 & 5 & 0 \\ 0 & 0 & 5 \end{bmatrix}, u = \begin{bmatrix} 1 \\ 0 \\ -4 \end{bmatrix}, v = \begin{bmatrix} a \\ b \\ c \end{bmatrix}$ .

Define  $T: \mathbb{R}^3 \rightarrow \mathbb{R}^3$  by  $T(x) = Ax$ . Find  $T(u)$  and  $T(v)$ .

4. Let  $x = \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}, u = \begin{bmatrix} -2 \\ 5 \end{bmatrix}$  and  $v = \begin{bmatrix} 7 \\ -3 \end{bmatrix}$  and let  $T: \mathbb{R}^2 \rightarrow \mathbb{R}^2$  be a linear transformation that maps  $x$  into  $x_1v_1 + x_2v_2$ . Find a matrix  $A$  such that  $T(x) = Ax$ .