Math 320 Linear Algebra
Assignment # 3

1. Consider the set of vectors, $\{\vec{v}_1, \vec{v}_2, \vec{v}_3, \vec{v}_4, \vec{v}_5, \vec{v}_6\}$. Suppose that the matrix:

$$A = \begin{bmatrix} \vec{v}_1 & \vec{v}_2 & \vec{v}_3 & \vec{v}_4 & \vec{v}_5 & \vec{v}_6 \end{bmatrix}$$

   is row equivalent to

$$\begin{bmatrix} 3 & 2 & -1 & 3/2 & -1 & 5 \\ 0 & 2 & 1 & 2 & 3 & 1 \\ 0 & 0 & 0 & 3/7 & -4 & 8 \\ 0 & 0 & 0 & 0 & 0 & 16 \end{bmatrix}.$$

   (a) Is $\{\vec{v}_1, \vec{v}_2, \vec{v}_3, \vec{v}_4, \vec{v}_5, \vec{v}_6\}$ linearly independent or dependent?

   (b) Is $\{\vec{v}_1, \vec{v}_2\}$ linearly independent or dependent?

   (c) Is $\{\vec{v}_1, \vec{v}_2, \vec{v}_3\}$ linearly independent or dependent?

   (d) Is $\vec{v}_3 \in \text{span}(\vec{v}_1, \vec{v}_2, \vec{v}_4, \vec{v}_5, \vec{v}_6)$?

   (e) Is $\vec{v}_3 \in \text{span}(\vec{v}_1, \vec{v}_2)$?

   (f) Is $\vec{v}_4 \in \text{span}(\vec{v}_1, \vec{v}_2, \vec{v}_3)$?

   (g) Is $\vec{v}_5 \in \text{span}(\vec{v}_1, \vec{v}_2, \vec{v}_3, \vec{v}_4)$?

   (h) Let

$$\vec{u} = \begin{bmatrix} 2 \\ 3 \\ 4 \\ 5 \end{bmatrix}.$$

   Is $\vec{u} \in \text{span}(\vec{v}_1, \vec{v}_2, \vec{v}_3, \vec{v}_4, \vec{v}_5, \vec{v}_6)$?

   (i) Let

$$\vec{w} = \begin{bmatrix} 2 \\ 4 \\ 5 \end{bmatrix}.$$

   Is $\vec{w} \in \text{span}(\vec{v}_1, \vec{v}_2, \vec{v}_3, \vec{v}_4, \vec{v}_5, \vec{v}_6)$?