# 1.7 Handwrite

**Welcoming Environment**: Actively listen to others and encourage everyone to participate! Keep an open mind as you engage in our class activities, explore consensus and employ collective thinking across barriers. Maintain a professional tone, show respect and courtesy, and make your contributions matter.

Discuss and keep track of any questions your group has. Ask me questions during group work time as well as when I bring us back together. Try to help each other solidify and review the language of linear algebra, algebra, visualizations and intuition from this section, including those related to:

- linearly independent set of vectors and connection to a homogeneous equation having only the trivial solution

- linearly dependent set of vectors and connection to nontrivial solutions existing and providing a dependance relation

- geometry of linearly independent set of 2 vectors: independent directions in space versus along the same line (Figure 1)

- geometry of linearly independent set of 3 or more vectors: no one vector is in the span of the rest, i.e. they are all needed to span the space versus redundancy in the geometric space they span in the sense that they aren't all needed to generate the same space under linear combinations (Figure 2)

- linearly independent columns of a matrix

- redundancy of $\vec{0}$ in a set of vectors $\{\vec{v}_1 = \vec{0}, \vec{v}_2, \ldots \vec{v}_n\}$ (Theorem 9)

Take out your notes from the activities due today as well as the fill-in guide. Use them and each other to respond to the following by handwriting in the language of our class. Use only what we have covered so far in our readings, videos and quizzes.

1. **Building Community**: What are the preferred first names of those sitting near you? If you weren't able to be there, give reference to anyone you had help from or write N/A otherwise.

2. Let $\vec{v}_1 = \begin{bmatrix} 1 \\ -3 \\ 2 \end{bmatrix}$, $\vec{v}_2 = \begin{bmatrix} -3 \\ 9 \\ -6 \end{bmatrix}$, and $\vec{v}_3 = \begin{bmatrix} 5 \\ -7 \\ h \end{bmatrix}$

   a) Is $\vec{v}_3$ ever in the span of $\{\vec{v}_1, \vec{v}_2\}$? If so, for which values of $h$? Show work/reasoning.

   b) Is $\{\vec{v}_1, \vec{v}_2, \vec{v}_3\}$ ever linearly independent. If so, for which values of $h$? Show work/reasoning.

3. Construct and analyze matrices directed below:

   a) Construct a $3 \times 2$ matrix $A$ so that $A\vec{x} = \vec{0}$ has a nontrivial solution.

   b) Are the columns of $A$ linearly independent?

   c) Construct a $3 \times 2$ matrix $B$ so that $B\vec{x} = \vec{0}$ has only the trivial solution.

   d) Are the columns of $B$ linearly independent?

   e) How many pivots do $A$ and $B$ each have? Show reasoning.

Next, as time allows before I bring us back together, work on the additional activities including any pollev activities and respond in your notes rather than here.

**Help each other and PDF responses to ASULearn**: If you are finished with the handwrite and additional activities before I bring us back together, first ensure that your entire group is finished too, and if not, help each other. Then submit your handwrite, continue reviewing and solidifying or discuss upcoming class work.

Collate your handwritten responses, preferably on this handout, into one full size multipage PDF for submission in the ASULearn assignment. I recommend you turn it in sometime today, but you have until the morning before the next class.