

1.8 and 1.9 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:

- linear transformation: addition and scalar multiplication
- left multiplication matrix representations algebraically and input-output diagram
- dilation, projection, reflection, rotation, shear (see Examples 2-5 in 1.8, Examples 2-3 in 1.9, and tables 1-4 in 2.8)
- the algebraic image of the unit axes as a way to find the matrix of the transformation
- range of a linear transformation: the algebraic or geometric images or outputs, e.g. of the unit square as a way to visualize the transformation and understand its effects
- the range, image or output of a sheared shape

Take out your notes from the activities due today as well as both fill-in guides. 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. a) Use standard mathematical axes on a rectangular coordinate system to sketch the following four vectors and label their coordinates, **all on one input-output diagram plot:**

i) $\begin{bmatrix} 4 \\ 2 \end{bmatrix}$

ii) $\begin{bmatrix} -2 \\ 4 \end{bmatrix}$

iii) $\begin{bmatrix} .5 & .5 \\ .5 & .5 \end{bmatrix} \begin{bmatrix} 4 \\ 2 \end{bmatrix}$

iv) $\begin{bmatrix} .5 & .5 \\ .5 & .5 \end{bmatrix} \begin{bmatrix} -2 \\ 4 \end{bmatrix}$

b) What kind of linear transformation is $\begin{bmatrix} .5 & .5 \\ .5 & .5 \end{bmatrix}$ (dilation, projection, reflection, rotation, shear, other)?

c) What is the span of the columns of $\begin{bmatrix} .5 & .5 \\ .5 & .5 \end{bmatrix}$?

d) What is the determinant of $\begin{bmatrix} .5 & .5 \\ .5 & .5 \end{bmatrix}$?

3. True/False: A linear transformation $T : \mathbb{R}^n \rightarrow \mathbb{R}^n$ is completely determined by its effect on the columns of the $n \times n$ identity matrix
- Handwrite the statement.
 - Identify the statement as true or false.
 - If this statement is false, provide a specific counterexample or reason. If it is true, quote a phrase from the glossary or a phrase and page number from our book in support of the statement.

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.