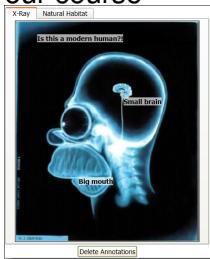


Solidify & Make Connections: Problem Sets 30%

- alone or in a group of 2 people. **turn in one per group—to one of your accounts.** each group must complete their own and in their own words. **last question—acknowledge any sources or people, aside from your partner or me:**
 - a) Disclosure Acknowledgment ☺ or Formal Citations 🖱
 - b) Look Back Annotation 🔍, c) 1 PDF in 1 ASULearn 📄
- annotations/explanations of by-hand + Maple work using only what we have covered so far and in the language of our course



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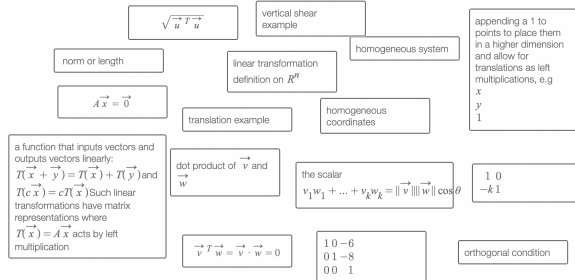


Card Sort 3

I asked you to select one or more pairings from the card sort I created and prepare to briefly report back in some way.

Share with your group (for example, you could comment on what most interested, challenged or surprised you, or what you had a question on) and prepare to share something from your group's discussions with the class when we come back together

Pair corresponding cards together by placing one on top of the other



Think-Share-Pair-Compare #1

1. Which linear transformations, if any, are not invertible—list any that are not invertible from among dilation, projection, reflection, rotation, shear, translation?

Discuss and prepare to share when I bring us together.

Think-Share-Pair-Compare #2

2. What do we need homogeneous coordinates for?

Discuss and prepare to share when I bring us together.

Think-Share-Pair-Compare #3

3. If two nonzero vectors in \mathbb{R}^3 are orthogonal, what can we say about their span?

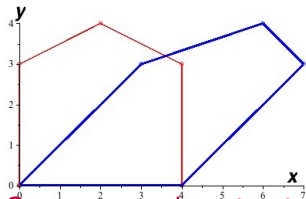
- a) the span is a line
- b) the span is a plane in \mathbb{R}^2
- c) the span is a plane in \mathbb{R}^3
- d) the span is \mathbb{R}^3
- e) none of the above

Respond on our usual pollev if you have tech.

Review Practice 3 #1

In the review 3 practice quiz you were to review and solidify the language of linear algebra as well as computations and conceptual understanding as you responded in your notes.

1. What is the matrix representation of this linear transformation that inputs the red house that is upright and outputs the blue house?



Compare and contrast your responses with your group.

Review Practice 3 #2

2. To rotate a figure counterclockwise by $\theta = 30^\circ$ about the point (5,7) we apply

$$\begin{bmatrix} 1 & 0 & 5 \\ 0 & 1 & -7 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} \cos \frac{\pi}{6} & -\sin \frac{\pi}{6} & 0 \\ \sin \frac{\pi}{6} & \cos \frac{\pi}{6} & 0 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} 1 & 0 & -5 \\ 0 & 1 & 7 \\ 0 & 0 & 1 \end{bmatrix} \text{ Figure}$$

If so write this in your notes and if not then write the correction in your notes.

Compare and contrast your responses with your group.

Review Practice 3 #3

3.

- In your notes, sketch input and output diagrams of projection of a figure in 2-space (your creation!) onto the $y = x$ line.
- Next, write a matrix representation of this linear transformation that projects vectors in \mathbb{R}^2 onto the $y = x$ line. Write down the matrix in your notes and label it as A .
- Lastly, show by-hand work in your notes to obtain the null space of this matrix, the set of solutions to $A\vec{x} = 0$

Compare and contrast your responses with your group.

Review Practice 3 #4 and #5

4.

- In your notes sketch the input and output diagrams of translation of a figure in 3-space (your creation!) 5 units in the z direction.
- Next, what is a matrix representation of translating vectors in \mathbb{R}^3 by 5 units in the z direction? Write down the matrix in your notes and label it as A .

5. If a linear transformation squishes space, e.g., say squishes from 2-space or 3-space to a line or the origin or squishes from 3-space to a plane, is the transformation invertible? Respond in your notes.

Compare and contrast your responses with your group.

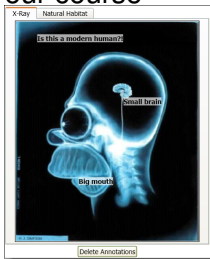
Review Practice 3 #6–8

6. Is a horizontal shear invertible? Respond in your notes.
7. Given only a visualization of a linear transformation acting on 2-space or 3-space, how can we visualize the column space of the corresponding matrix representation? Respond in your notes.
- 8.
- How did transpose arise in this module? Respond in your notes.
 - How did orthogonality arise in this module? Respond in your notes.

Compare and contrast your responses with your group.

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