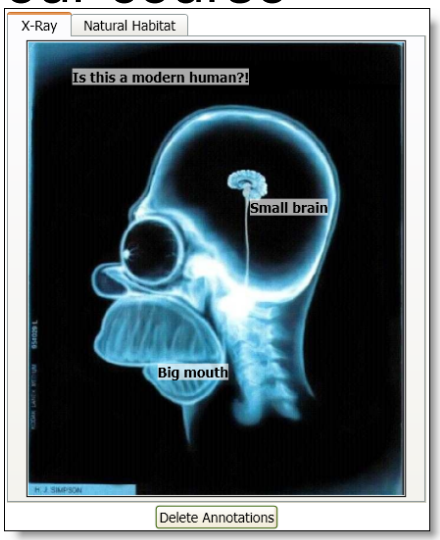
Solidify & Make Connections: Problem Sets 30%

- 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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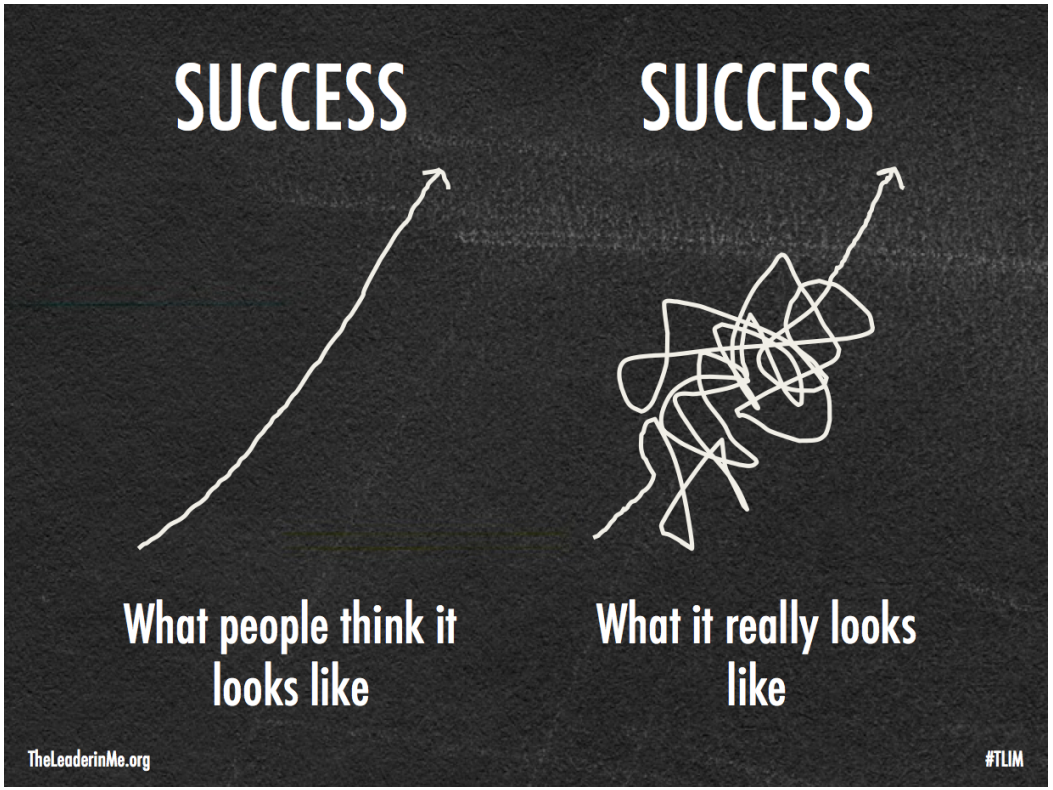


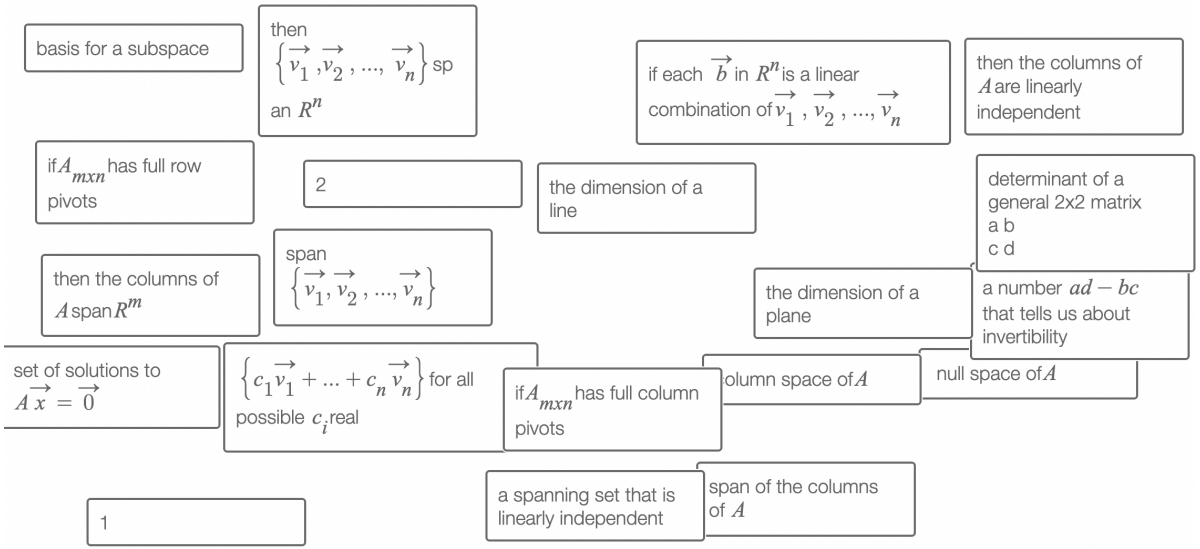
Image 1 https://mathequalslove.blogspot.com/p/free-classroom-posters.html
Image 2 https://www.leaderinme.org/blog/the-power-of-a-growth-mindset/

Card Sort 2

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. Suppose the last column of AB is entirely zero but B itself has no column of zeros. What can we say about the columns of A?

Discuss and prepare to share when I bring us together.

Think-Share-Pair-Compare #2

2. Give an example of a matrix $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$ such that $ad - bc = 0$ and answer all of the following:

   a) Are the columns of A linearly independent?

   b) What does your answer to part a) imply about the number of solutions to $A\vec{x} = \vec{0}$?

   c) Parameterize the nullspace of A in your notes. What is its dimension?

Discuss and prepare to share when I bring us together.

Think-Share-Pair-Compare #3

3. Look at $M = \begin{bmatrix} 1 & 4 \\ 2 & 5 \\ 3 & 6 \end{bmatrix}$.

- Apply the rank-nullity theorem to fill in the blanks:

  rank M + nullity M = _____ + _____ = _____

  So it will look something like 1+ 2 = 3, but the relevant numbers for this matrix.

Discuss and write your group's response on a board.

Review Practice 2 #1

In the review 2 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.

- First, identify whether $AB = BA$ and name this algebraic operation too.
- Next, identify whether $(AB)C = A(BC)$ and name this algebraic operation too.

Compare and contrast your responses with your group.

Review Practice 2 #2

2.

- Assume D is invertible. Apply the inverse to both sides of $D\vec{x} = \vec{b}$. Name and show all the algebraic steps as you reduce.
- What does the above *directly* show us (i.e. from related definitions rather than any theorems)?
- How about *indirectly*, what else can we say?
- How many total algebraic steps are needed to reduce $D\vec{x} = \vec{b}$?

Compare and contrast your responses with your group.

Review Practice 2 #3

3.

- By hand, compute $\begin{bmatrix} -1 & 3 \\ 2 & 4 \\ 5 & -3 \end{bmatrix} \begin{bmatrix} 4 & -2 \\ -2 & 3 \end{bmatrix}$ and show work, but no need to reduce.
- Next, by hand, compute the inverse of $\begin{bmatrix} 4 & -2 \\ -2 & 3 \end{bmatrix}$ and show work, but no need to reduce.
- Lastly, by hand, compute the transpose of $\begin{bmatrix} 4 & -2 \\ -2 & 3 \end{bmatrix}$ and show work, but no need to reduce.

Compare and contrast your responses with your group.

Review Practice 2 #4 and #5

4. What elementary row operation does multiplying on the left by $\begin{bmatrix} 1 & 0 \\ -2 & 1 \end{bmatrix}$ represent?

5. What is the difference between a basis for a space and the entire space—e.g., a basis for the null space versus the entire null space or a basis for the column space versus the entire column space?

Compare and contrast your responses with your group.

Review Practice 2 #6

6. Assume that $\begin{bmatrix} 3 & 3 & 1 & 0 \\ 2 & 11 & 1 & 0 \\ 5 & 14 & 2 & 0 \end{bmatrix}$ reduces to $\begin{bmatrix} 3 & 3 & 1 & 0 \\ 0 & 9 & \frac{1}{3} & 0 \\ 0 & 0 & 0 & 0 \end{bmatrix}$.

- Show work as you write the algebraic null space of $A = \begin{bmatrix} 3 & 3 & 1 \\ 2 & 11 & 1 \\ 5 & 14 & 2 \end{bmatrix}$.
- Next, write a basis for the null space of A
- Switching spaces, is $\left\{ \begin{bmatrix} 3 \\ 0 \\ 0 \end{bmatrix}, \begin{bmatrix} 3 \\ 9 \\ 0 \end{bmatrix} \right\}$ a basis for the column space of A? How can we tell from setting the bottom right spot of ref from strict Gaussian of $[A\vec{b}]$ equal to 0?
- Lastly, what does the rank-nullity theorem tell us in general and in this example?

Compare and contrast your responses with your group.

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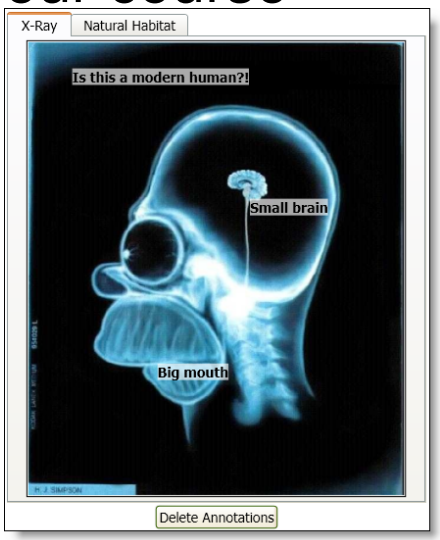

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