Part I (due Friday, January 12 at the beginning of class)

Now that we've seen some situations in which systems of equations arise, we are ready to start working toward an efficient method for solving systems of equations as well as studying the structures we obtain from systems of equations. To begin, read What can we expect (the whole section).

Reading Questions

Activity 1.1.1 in your reading. Also, fill out this office hours survey before class Friday.

Part II (prepare for Friday, January 12)

Activity 1.1.2 in the reading.

Part III: Homework (due Wednesday, January 17 at the beginning of class)

1. In class, we decided that every point in the plane could be reached by using a hover board that can move via $\begin{bmatrix} 3 \\ 1 \end{bmatrix}$ and a magic carpet that can move via $\begin{bmatrix} 1 \\ 2 \end{bmatrix}$ and discussed that we thus say

$$\text{span}\left\{ \begin{bmatrix} 3 \\ 1 \end{bmatrix}, \begin{bmatrix} 1 \\ 2 \end{bmatrix} \right\} = \mathbb{R}^2.$$

   Now suppose that your modes of transportation are given by $\begin{bmatrix} a \\ b \end{bmatrix}$ and $\begin{bmatrix} c \\ d \end{bmatrix}$, where a, b, c, and d are real numbers. Determine what must be true about the relationship(s) among a, b, c, and d so that you can still reach every point in the plane. Carefully explain your reasoning in your answer.

2. Suppose you now have three modes of transportation: a broomstick that moves via the vector $\begin{bmatrix} -1 \\ 2 \end{bmatrix}$, winged shoes that move via the vector $\begin{bmatrix} 3 \\ 4 \end{bmatrix}$, and a jet pack that moves via the vector $\begin{bmatrix} 5 \\ 0 \end{bmatrix}$.

   (a) Write an equation using the vectors to describe travelling to the location $(3, -6)$. Explain all parts of your equation in the context of travelling to that point.

   (b) Write a system of equations to describe the same situation as in part (a).

   (c) Can $(3, -6)$ be reached using these modes of transportation? Choose one of the following as your answer and explain why. If possible, give an example of a way to make this trip using the three modes of transportation by listing the amount of time travelled on each and the direction (forward or backward) on each. If not possible, clearly explain why not.

      i. Yes, there is exactly one way to do this.

      ii. Yes, there are many ways to do this.

      iii. No, there is no way to do this.