Prework Week #3: Linear Combination and Span

January 22, 2013

NAME: 

TARDIS\(^1\): 

http://math.ucsb.edu/~kgracekennedy/Winter2013_AA.html

Instructions: 

- Print out this page or come get a copy from in front of my office, and write directly on it. Show all work, and box your final answers.
- Complete the following questions on BOTH pages and hold onto them until I give out TARDIS codes.

### 3.1 Check your understanding

**Problem 3.1.** Write down the formal definition of linear independence from lecture or section last week. Give an informal definition of linear independence. Use your own language to explain how you understand linear independence.

**Problem 3.2.** Write down the formal definition of span from lecture or section last week. Give an informal definition of span. Again, use your own language to explain how you understand the span of vectors.

---

\(^1\) I’ll give this to you in section this week.
3.2 The Maiden Voyage

You are a young traveler, leaving home for the first time. Your parents want to help you on your journey, so just before your departure, they give you two gifts. Specifically, they give you two forms of transportation: a hover board and a magic carpet. Your parents inform you that both the hover board and the magic carpet have restrictions in how they operate:

- We denote the restriction on the hover board’s movement by the vector

\[
\begin{bmatrix}
3 \\
1
\end{bmatrix}
\]

By this we mean that if the hover board traveled “forward” for one hour, it would move along a “diagonal” path that would result in a displacement of 3 miles East and 1 mile North of its starting location.

- We denote the restriction on the magic carpet’s movement by the vector

\[
\begin{bmatrix}
1 \\
2
\end{bmatrix}
\]

By this we mean that if the magic carpet traveled “forward” for one hour, it would move along a “diagonal” path that would result in a displacement of 1 mile East and 2 miles North of its starting location.

Your Uncle Cramer suggests that your first adventure should be to go visit the wise man, Old Man Gauss. Uncle Cramer tells you that Old Man Gauss lives in a cabin that is 107 miles East and 64 miles North of your home.

**Problem 3.3.** Can you use the hover board and the magic carpet to get to Gauss’s cabin. If so, how? If not, why is that the case?

Use the vector notation for each mode of transportation as part of your exploration. Use a diagram or graphic to help you illustrate your point(s).