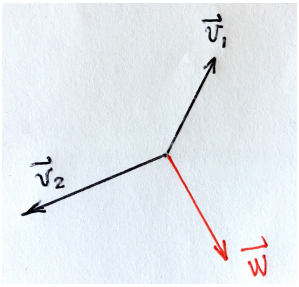
Due before lecture on Wednesday, September 9, 2019

1. Consider the expression $4\begin{bmatrix}1\\-3\end{bmatrix} - 2\begin{bmatrix}3\\5\end{bmatrix}$.
   (a) Sketch a graphical representation of this expression using vectors.
   (b) Describe in words what the scalars 4 and -2 represent in the sketch.

2. Vectors $\vec{v}_1$, $\vec{v}_2$, and $\vec{w}$ are given in the picture below. Use graphical method only (drawing pictures), without any numerical calculation, to determine whether $\vec{w}$ a linear combination of $\vec{v}_1$ and $\vec{v}_2$. If not, why not? If yes, estimate the value of the scalars in front of $\vec{v}_1$ and $\vec{v}_2$ respectively.



3. Find the amount of gas used by each of the two cars. The first car gets 30 miles/gallon and the second car gets 21 miles/gallon. The total amount of gas used by both cars is 600 gallons and the total distance traveled by both cars is 16200 miles.

4. Is it still possible to reach Old Man Gauss if you are given each of the following modes of transportation in stead of the hover board and magic carpet? Write a convincing argument that justify your conclusion. Use sentences, calculations, pictures, and anything that helps support your justification.
   (a) only the hover board with velocity $\begin{bmatrix}3\\1\end{bmatrix}$ miles/hour.
   (b) only the magic carpet with velocity $\begin{bmatrix}1\\2\end{bmatrix}$ miles/hour.
   (c) a hover board with velocity $\begin{bmatrix}3\\1\end{bmatrix}$ miles/hour and a super hover board with with velocity $\begin{bmatrix}6\\2\end{bmatrix}$ miles/hour.
   (d) a hover board with velocity $\begin{bmatrix}3\\1\end{bmatrix}$ miles/hour, a magic carpet with velocity $\begin{bmatrix}1\\2\end{bmatrix}$ miles/hour, and a broomstick with velocity $\begin{bmatrix}2\\7\end{bmatrix}$ miles/hour.

5. Determine whether the vector $\begin{bmatrix}2\\-1\\3\end{bmatrix}$ is a linear combination of the vectors $\begin{bmatrix}1\\0\\0\end{bmatrix}$, $\begin{bmatrix}-1\\1\\0\end{bmatrix}$, and $\begin{bmatrix}-1\\1\\1\end{bmatrix}$. Detail your reasons.