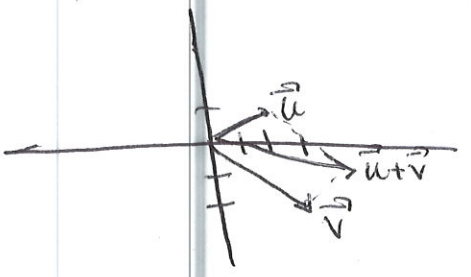
MAT 202, Quiz #8, Summer 2016 Name KEY

Instructions: Show all work. Some problems will instruct you to complete operations by hand, some can be done in the calculator. To show work on calculator problems, show the commands you used, and the resulting matrices. **Give exact answers** (yes, that means fractions, square roots and exponentials, and not decimals) unless specifically directed to give a decimal answer. This will require some operations to be done by hand even if not specifically directed to. Be sure to complete all parts of each question.

1. Using the vectors $\vec{u} = \begin{bmatrix} 2 \\ 1 \end{bmatrix}$ and $\vec{v} = \begin{bmatrix} 3 \\ -2 \end{bmatrix}$. Sketch the vectors and sketch each of the following:

   a. $\vec{u} + \vec{v}$

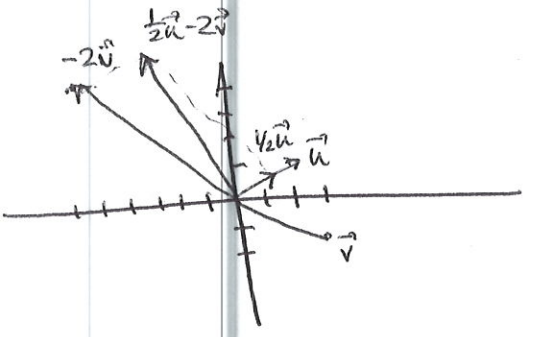
$$\begin{bmatrix} 2 \\ 1 \end{bmatrix} + \begin{bmatrix} 3 \\ -2 \end{bmatrix} = \begin{bmatrix} 5 \\ -1 \end{bmatrix}$$



   b. $\frac{1}{2}\vec{u} - 2\vec{v}$

$$\begin{bmatrix} 1 \\ \frac{1}{2} \end{bmatrix} - \begin{bmatrix} 6 \\ -4 \end{bmatrix} =$$

$$\begin{bmatrix} -5 \\ 9/2 \end{bmatrix}$$



2. Find a counterexample to one of the 10 vector space properties to show that the following sets are not vector spaces.

   a. $H = \left\{ \begin{bmatrix} x \\ y \end{bmatrix} : x \geq 0, y \in R \right\}$ fails scalar multiplication $\begin{bmatrix} 1 \\ 2 \end{bmatrix}$ in set

$-1\begin{bmatrix} 1 \\ 2 \end{bmatrix} = \begin{bmatrix} -1 \\ -2 \end{bmatrix}$ not in set

   b. $V = \left\{ \begin{bmatrix} a & b \\ c & 1 \end{bmatrix} : a, b, c \in R \right\}$ fails all 3

e.g. no $\vec{0}$ $a,b,c = 0$ $\begin{bmatrix} 0 & 0 \\ 0 & 1 \end{bmatrix} \neq \vec{0}$

   c. $W = \{at^2 : a \neq 0,\ p(t) \in P_2\}$

no zero since $a \neq 0$

also at^2 and $-at^2$ in set but $at^2 + (-at^2)$ not in set