MATH 129A (8) **SPRING 2017** **QUIZ 3**

NAME: Zayd Hammoudeh

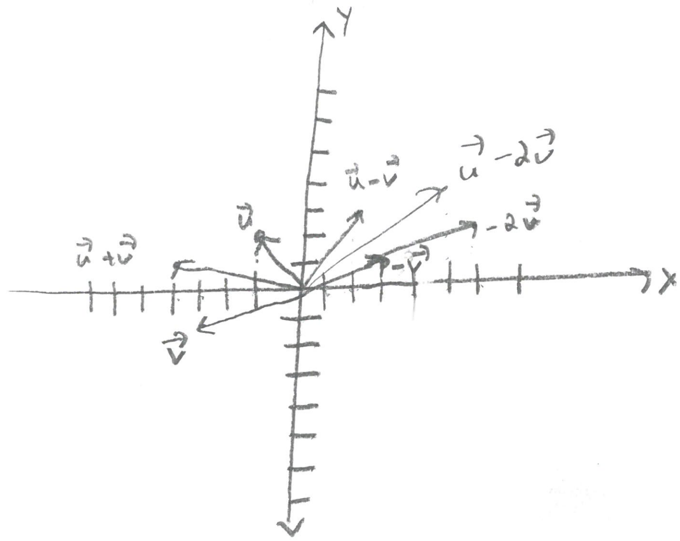
5pts

1. 3 pts. Display the following vectors using arrows on an xy - graph: $\mathbf{u}$, $\mathbf{v}$, $-\mathbf{v}$, $-2\mathbf{v}$, $\mathbf{u}+\mathbf{v}$, $\mathbf{u}-\mathbf{v}$, and $\mathbf{u}-2\mathbf{v}$. Notice that $\mathbf{u}-\mathbf{v}$ is the vertex of a parallelogram whose other vertices are $\mathbf{u}$, $\mathbf{o}$, and $-\mathbf{v}$.

$\mathbf{u} = \begin{bmatrix}-1\\2\end{bmatrix}$, $\mathbf{v} = \begin{bmatrix}-3\\-1\end{bmatrix}$.

$-v = -1\cdot\vec{v} = -1\begin{bmatrix}-3\\-1\end{bmatrix} = \begin{bmatrix}3\\1\end{bmatrix}$

$-2v = -2\cdot\vec{v} = -2\begin{bmatrix}-3\\-1\end{bmatrix} = \begin{bmatrix}6\\2\end{bmatrix}$



$u+v = \begin{bmatrix}-1\\2\end{bmatrix} + \begin{bmatrix}-3\\-1\end{bmatrix} = \begin{bmatrix}-4\\1\end{bmatrix}$

$u-v = \begin{bmatrix}-1\\2\end{bmatrix} + (-1)\begin{bmatrix}-3\\-1\end{bmatrix} = \begin{bmatrix}-1\\2\end{bmatrix} + \begin{bmatrix}3\\1\end{bmatrix} = \begin{bmatrix}2\\3\end{bmatrix}$ $\vec{u}-2\vec{v} = \begin{bmatrix}-1\\2\end{bmatrix} - 2\begin{bmatrix}-3\\-1\end{bmatrix} = \begin{bmatrix}-1\\2\end{bmatrix} + \begin{bmatrix}6\\2\end{bmatrix} = \begin{bmatrix}5\\4\end{bmatrix}$

2. 2 pts. Let $\boldsymbol{a_1} = \begin{bmatrix}1\\4\\-2\end{bmatrix}$, $\boldsymbol{a_2} = \begin{bmatrix}-2\\-3\\7\end{bmatrix}$, and $\mathbf{b} = \begin{bmatrix}4\\1\\h\end{bmatrix}$. For what value(s) of h is $\boldsymbol{b}$ in the plane spanned by $\boldsymbol{a_1}$ and $\boldsymbol{a_2}$?

If $\vec{b}$ is span $\{\vec{a}_1, \vec{a}_2\}$, it is a linear combination. Then check what value of h make the system consistent.

$\begin{bmatrix}1 & -2 & 4\\4 & -3 & 1\\-2 & 7 & h\end{bmatrix}$

$R_2' = R_2 - 4R_1$
$R_3' = R_3 + 2R_1$

⇓

$\begin{bmatrix}1 & -2 & 4\\0 & 5 & -15\\0 & 3 & h+8\end{bmatrix} \rightarrow \begin{bmatrix}1 & -2 & 4\\0 & 5 & -15\\0 & 3 & h+12\end{bmatrix}$

$R_2' = \frac{1}{5}R_2$

⇓

$\begin{bmatrix}1 & -2 & 4\\0 & 1 & -3\\0 & 3 & h+8\end{bmatrix}$

$R_3' = R_3 - 3R_2$

⇓

$\begin{bmatrix}1 & -2 & 4\\0 & 1 & -3\\0 & 0 & h+17\end{bmatrix}$

$h+17=0$

$\boxed{h=-17}$

math checking
$-2+6=4$
$-8+9=1$
$+4\ \ -21=-17$

math checking

$4\ -3\ 1$	$-2\ 7\ h$	$0\ 3\ h+8$
$-4\cdot1\ -4\cdot-2\ 4\cdot(-4)$	$2\cdot1\ 2\cdot-2\ 4\cdot2$	$0\ 1\cdot-3(+3\cdot-3)$
$4\ -3\ 1$	$-2\ 7\ h$	$0\ 3\ h+8$
$-4\ +8\ -16$	$2\ -4\ 8$	$0\ -3\ 9$
$0\ 5\ -15$	$0\ 3\ h+8$	$0\ h+17$