## Due as follows:

| Dr. Kondratieva | Tuesday September 21 | in class or assignment box |
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| Dr. Goodaire | Wednesday September 22 | 9:50 a.m. |
| Dr. Yuan | Wednesday September 22 | in class |

[1] 1. If $B=(1,4)$ and $\overrightarrow{A B}=\left[\begin{array}{r}-1 \\ 2\end{array}\right]$, find $A$.
[2] 2. If possible, express $x=\left[\begin{array}{r}6 \\ -2 \\ 8\end{array}\right]$ as a scalar multiple of $u=\left[\begin{array}{c}4 \\ -\frac{4}{3} \\ \frac{16}{3}\end{array}\right]$, of $v=\left[\begin{array}{c}\frac{1}{2} \\ -\frac{1}{6} \\ \frac{4}{3}\end{array}\right]$, of $w=\left[\begin{array}{r}-3 \\ 1 \\ -4\end{array}\right]$, and of $y=\left[\begin{array}{r}15 \\ -5 \\ 20\end{array}\right]$. Justify your answers.
[2] 3. Find the indicated vectors.
(a) $a\left[\begin{array}{r}-1 \\ 5\end{array}\right]-3\left[\begin{array}{r}-a \\ 2\end{array}\right]$
(b) $2\left[\begin{array}{r}-1 \\ 0 \\ 1\end{array}\right]+5\left[\begin{array}{r}-3 \\ 2 \\ -1\end{array}\right]+3\left[\begin{array}{r}3 \\ -1 \\ 3\end{array}\right]$
[3] 4. Shown to the right are two nonparallel

|  |  | $\mathrm{w}_{1}$ | u |
| :--- | :--- | :--- | :--- | :--- |
| $\mathrm{w}_{2}$ | v |  |  |
|  |  |  |  |
|  |  |  |  |
| $\mathrm{w}_{3}$ |  |  | $\mathrm{w}_{4}$ |

A
[3] 5. Suppose $A B C$ is a triangle. Let $D$ be the midpoint of $A B$ and $E$ be the midpoint of $A C$. Use vectors to show that $D E$ is parallel to $B C$ and one half its length.
$D \quad E$

B C
[1] 6. If possible, express $\left[\begin{array}{l}7 \\ 7\end{array}\right]$ as a linear combination of $\left[\begin{array}{r}-1 \\ 1\end{array}\right]$ and $\left[\begin{array}{l}5 \\ 2\end{array}\right]$.
[2] 7. Suppose $u$ and $v$ are vectors. Show that any linear combination of $u$ and $v$ is a linear combination of $2 u$ and $-3 v$.
[2] 8. Show that if some nontrivial linear combination of vectors $u$ and $v$ is 0 , then $u$ and $v$ are parallel.
[16]

