

7.5

$$1) \vec{v} + 2\vec{v}_2 - 5\vec{v}_1 = \vec{0}$$

$$\begin{aligned}\vec{v} &= -2\vec{v}_2 + 5\vec{v}_1 \\ &= -2 \begin{pmatrix} -1 \\ 4 \end{pmatrix} + 5 \begin{pmatrix} -2 \\ 3 \end{pmatrix} \\ &= \begin{pmatrix} -2 \cdot (-1) + 5 \cdot (-2) \\ -2 \cdot 4 + 5 \cdot 3 \end{pmatrix} \\ &= \begin{pmatrix} -8 \\ 7 \end{pmatrix}\end{aligned}$$

$$2) -3\vec{v} - \vec{v}_3 = \frac{1}{2}\vec{v}_3 - \vec{v}_1$$

$$\begin{aligned}-3\vec{v} &= \frac{3}{2}\vec{v}_3 - \vec{v}_1 \\ \vec{v} &= -\frac{1}{2}\vec{v}_3 + \frac{1}{3}\vec{v}_1 \\ &= -\frac{1}{2} \begin{pmatrix} 3 \\ 4 \end{pmatrix} + \frac{1}{3} \begin{pmatrix} -2 \\ 3 \end{pmatrix} \\ &= \begin{pmatrix} -\frac{1}{2} \cdot 3 + \frac{1}{3} \cdot (-2) \\ -\frac{1}{2} \cdot 4 + \frac{1}{3} \cdot 3 \end{pmatrix} \\ &= \begin{pmatrix} -\frac{13}{6} \\ -1 \end{pmatrix}\end{aligned}$$

$$3) \frac{5}{3}\vec{v} + \frac{3}{2}\vec{v}_4 = \vec{v}_3 - 2\vec{v}_2$$

$$\begin{aligned}\frac{5}{3}\vec{v} &= \vec{v}_3 - 2\vec{v}_2 - \frac{3}{2}\vec{v}_4 \\ \vec{v} &= \frac{3}{5}\vec{v}_3 - \frac{6}{5}\vec{v}_2 - \frac{9}{10}\vec{v}_4 \\ &= \frac{3}{5} \begin{pmatrix} 3 \\ 4 \end{pmatrix} - \frac{6}{5} \begin{pmatrix} -1 \\ 4 \end{pmatrix} - \frac{9}{10} \begin{pmatrix} 4 \\ 0 \end{pmatrix} \\ &= \begin{pmatrix} \frac{3}{5} \cdot 3 - \frac{6}{5} \cdot (-1) - \frac{9}{10} \cdot 4 \\ \frac{3}{5} \cdot 4 - \frac{6}{5} \cdot 4 - \frac{9}{10} \cdot 0 \end{pmatrix} \\ &= \begin{pmatrix} -\frac{3}{5} \\ -\frac{12}{5} \end{pmatrix}\end{aligned}$$