Linear Combinations Example

MATH 204: Linear Algebra

Suppose $\mathbf{a_1} = \begin{bmatrix} 1 \\ 0 \\ 3 \end{bmatrix}$, $\mathbf{a_2} = \begin{bmatrix} 4 \\ 2 \\ 14 \end{bmatrix}$ and $\mathbf{a_3} = \begin{bmatrix} 3 \\ 6 \\ 10 \end{bmatrix}$.

(a) In words, explain how you would determine whether or not $\mathbf{b} = \begin{bmatrix} -1 \\ 8 \\ -5 \end{bmatrix}$ is a linear combination of $\mathbf{a_1}$,

$\mathbf{a_2}$ and $\mathbf{a_3}$.

(b) Following your guidelines above, determine IF $\mathbf{b}$ is a linear combination of $\mathbf{a_1}$, $\mathbf{a_2}$ and $\mathbf{a_3}$.

(c) If you determined that $\mathbf{b}$ is a linear combination, show explicitly what it is.