Quiz 5 Vector Equations.

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September 5, 2018

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Suppose that

$$v_1 = \begin{pmatrix} 1 \\ 2 \\ 4 \end{pmatrix}, \quad v_2 = \begin{pmatrix} 1 \\ 1 \\ 3 \end{pmatrix}, \quad v_3 = \begin{pmatrix} 3 \\ 0 \\ 6 \end{pmatrix} \quad \text{and } w \begin{pmatrix} 2 \\ 1 \\ t \end{pmatrix}$$

where t is a parameter.

Answer these questions.

1. Write down the augmented matrix M which expresses the condition that w is a linear combination of v_1, v_2, v_3.

   Answer: $\begin{bmatrix} 1 & 1 & 3 & 2 \\ 2 & 1 & 0 & 1 \\ 4 & 3 & 6 & t \end{bmatrix}$.

2. Suppose that the REF of M is known to be $M^* = \begin{bmatrix} 1 & 1 & 3 & 2 \\ 0 & -1 & -6 & -3 \\ 0 & 0 & 0 & t-5 \end{bmatrix}$.

   Determine all values of t for which $w \in Span\{v_1, v_2, v_3\}$

   Explain your reasoning briefly. **Answer:** The last equation of the REF is consistent only if $t = 5$. Moreover, at $t = 5$, we have a consistent system of equations.