

Math 54 Worksheet

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Solve the following problems (and let me know if you have any questions or catch a typo).

1. Is $(1, 2, 0)$ in the span of $(1, 0, 0), (0, 1, 0)$?
2. Suppose I throw a ball from the position \vec{x}_0 with velocity vector $\vec{v}(t)$ such that:

$$\vec{x}_0 = \begin{pmatrix} 0 \\ 0 \\ 1 \end{pmatrix} \qquad \vec{v}(t) = \begin{pmatrix} 1 \\ 2 \\ 1 - 10t \end{pmatrix}$$

Determine the location of the ball when the third coordinate of the position vector of the ball is zero.

3. Write the vector $(9, 6)$ as a linear combination of the vectors $(1, 2)$ and $(1, -4)$
4. Construct a 3×3 matrix A and vectors $b, c \in \mathbb{R}^3$ so that $Ax = b$ has a solution but $Ax = c$ does not.
5. Write down the following linear system of equations in the form $Ax = b$

$$\begin{aligned} x - 3y + 4z &= -4 \\ 3x - 7y + 7z &= -8 \\ -4x + 6y - z &= 7 \end{aligned}$$

6. Let $\vec{u} = \begin{pmatrix} 2 \\ -3 \\ 2 \end{pmatrix}$ and $A = \begin{pmatrix} 5 & 8 & 7 \\ 0 & 1 & -1 \\ 1 & 3 & 0 \end{pmatrix}$ is \vec{u} in the subset of \mathbb{R}^3 spanned by the columns of A ? Why or why not?