Answer True / False

Let $\begin{aligned} \mathbf{v_1} &= (1,3,18,2) \\ \mathbf{v_2} &= (2,-1,9,0) \\ \mathbf{v_3} &= (3,2,-4,1) \\ \mathbf{v_4} &= (4,7,1,3) \end{aligned}$ and $A = \begin{bmatrix} 1 & 3 & 2 \\ -2 & 1 & 4 \\ 6 & 2 & 1 \\ 5 & -17 & 32 \end{bmatrix}$

1. The vectors $\{\mathbf{v_1}, \mathbf{v_2}, \mathbf{v_3}, \mathbf{v_4}\}$ span $\mathbb{R}^4$
2. The columns of A span $\mathbb{R}^4$
3. The equation $B\mathbf{x} = \mathbf{b}$ has a unique solution where $B = [\mathbf{v_1}\ \mathbf{v_2}\ \mathbf{v_3}\ \mathbf{v_4}]$ and $\mathbf{b} = \left(72, -128, \pi, e^{-411}\right)$
4. There exists $\mathbf{b} \in \mathbb{R}^4$ such that $A\mathbf{x} = \mathbf{b}$ has infinitely many solutions.