

The Symbol “ \in ”

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A **set** is a collection of objects (or **elements**). We usually denote the collection with brackets “ $\{\}$ ”. We usually denote sets by capital letters, such as A , B , and so on. Some sets even have special names, such as $\text{span}\{\}$. If x is an element of a set A , we write $x \in A$.

Example 1. Let A be the set of all prime numbers less than 10. We can write this set as follows:

$$A = \{2, 3, 5, 7\}$$

- The numbers 2, 3, 5, 7 are elements of the set A , so we write $2, 3, 5, 7 \in A$.
- The number 8 is not inside the set A , so we write $8 \notin A$.

Example 2. Let $\mathbf{v}_1 = \begin{pmatrix} 1 \\ 0 \\ 3 \end{pmatrix}$, $\mathbf{v}_2 = \begin{pmatrix} -2 \\ 1 \\ 0 \end{pmatrix}$, $\mathbf{v}_3 = \begin{pmatrix} 3 \\ -1 \\ 3 \end{pmatrix}$. Let $S = \text{span}\{\mathbf{v}_1, \mathbf{v}_2, \mathbf{v}_3\}$. Then

- Notice that $\mathbf{v}_1, \mathbf{v}_2, \mathbf{v}_3 \in \mathbf{R}^3$ (they are three dimensional vectors)
- $\mathbf{v}_1, \mathbf{v}_2, \mathbf{v}_3 \in S$
- The vector $\begin{pmatrix} 1 \\ 1 \\ 9 \end{pmatrix} \in S$ (can you show why?)
- The vector $\begin{pmatrix} 1 \\ -4 \\ 5 \end{pmatrix} \notin S$ (can you show why?)