

# 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?)