



**Why**

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**Definition**

Let  $(V, E)$  be a directed graph. A *directed path* between vertex  $v$  and vertex  $w \neq v$  is a finite sequence of distinct vertices, whose first coordinate is  $v$  and whose last coordinate is  $w$ , and whose consecutive coordinates (as ordered pairs) are edges in the graph. We say that a path between  $v$  and  $w$  is from  $v$  to  $w$ . The *length* of the path is one less than the number of vertices: namely, the number of edges.

Two vertices are *connected* in a graph if there exists at least one path between them. A directed graph is *connected* if there is a path between every pair of vertices. A graph is *acyclic* if none of its paths cycle.

**Other Terminology**

Some authors allow paths to contain repeated vertices, and call a path with distinct vertices a *simple path*. Similarly, some authors allow a cycle to contain repeated vertices, and call a path with distinct vertices a *simple cycle* or *circuit*. Some authors use the term *loop* instead of *cycle*.

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<sup>1</sup>Future editions will include.



