

## Directed Graphs

A directed graph  $\mathcal{G}$  consists of a set of nodes and a set of edges, where each edge goes from one node (the source) to another node (the destination, possibly the same as the source). There are two natural ways to define a path of a graph:

- A path  $\pi$  of  $\mathcal{G}$  is a nonempty (finite or infinite) sequence  $s_1, s_2, \dots$  of nodes of the graph such that there is an edge from  $s_i$  to  $s_{i+1}$ , for each positive integer  $i$  less than the length of (the sequence)  $\pi$ .
- A path  $\pi$  of  $\mathcal{G}$  is a nonempty (finite or infinite) sequence  $e_1, e_2, \dots$  of edges of the graph such that the destination node of  $e_i$  equals the source node of  $e_{i+1}$ , for each positive integer  $i$  less than the length of (the sequence)  $\pi$ .

People also describe a path informally as an alternating sequence of nodes and edges, but that would be a needlessly complicated way of defining it mathematically.