Directed Graphs

In this course, a graph is undirected unless otherwise stated.

A directed graph is a set N of nodes and a set A of arcs such that each $a \in A$ is associated with an ordered pair of nodes (the endpoints of a).

- In diagrams, the arcs are shown with arrows from source node to target node
- In a path $a_1, \ldots, a_n$ in a directed graph the source of a_{i+1} must match the target of a_i (for $i = 1, \ldots, n-1$)
- For any pair of nodes x, y, if there is at most one arc from x to y then we can refer to this arc as (x, y)

The indegree of a node x is the number of arcs entering x.

The outdegree of a node x is the number of arcs leaving x.

For any directed graph, the sum of the indegrees of all nodes = the sum of the outdegrees of all nodes = the number of arcs.

A directed graph is strongly connected if for any $x, y \in nodes(G)$ there is a path from x to y. So, for any pair of nodes x, y we need paths both from x to y and from y to x.