Connectivity

... more definitions :

Recall that two vertices x and y are **connected** if there is a path from x to y.

Note that a vertex x is always connected to itself (by a path of length 0)

Note that if x is connected to y, then y is connected to x

Note that if x is connected to y and y is connected to z, then x is connected to z.

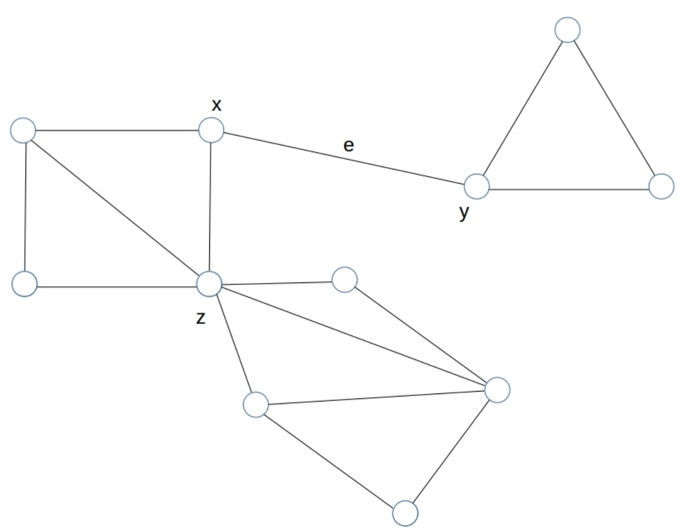
So the "connected to" relationship is reflexive, symmetric and transitive ...i.e. it is an equivalence relation.

The equivalence classes of the "connected to" relation define what we call the **connected components** of the graph G.

More intuitively, each connected component of G is a maximal set of vertices that are all connected to each other.

We say that G is **connected** if G has exactly one connected component (i.e. for every pair of vertices x and y, G contains an xy-path).

Let G = (V,E) be a graph. If x is a vertex of G such that if we delete x from V (which means we also have to delete all edges that touch x) the number of connected components increases, then we call x a **cut-vertex** of G. Similarly, if e is an edge such that deleting e from E increases the number of connected components, we call e a **cut-edge** or **bridge** of G.



In the graph shown above, the cut-vertices are x, y and z. The only cut-edge is e.

Cut-vertices and cut-edges are important because in a communication or transportation network, they are the bottlenecks.