養天地正氣 法古今完人

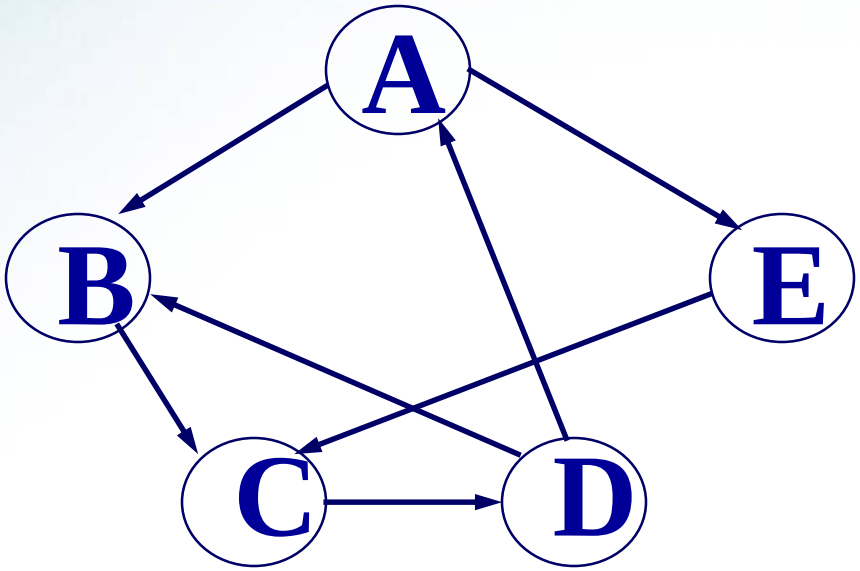
图的定义及实现

图的定义

- A *graph G* consists of a set *V* , whose members are called the *vertices*(*顶点*) of *G*, together with a set *E* of pairs of distinct vertices from *V* .
- The pairs in *E* are called the *edges*(*边*) of *G*.
- If *e=(v,w)* is an edge with vertices *v* and *w*, then *v* and *w* are said to *lie on*(*依附于*) *e*, and *e* is said to be *incident* with(*与...相关连*) *v* and *w*.
- If the pairs are unordered, *G* is called an *undirected graph*(*无向图*).
- If the pairs are ordered, *G* is called a *directed graph*(*有向图*). The term *directed graph* is often shortened to *digraph*, and the unqualified term *graph* usually means *undirected graph*.

图的定义

例如: $G_1 = (V_1, E_1)$



其中

V_1={A, B, C, D, E}

E_1={<A,B>, <A,E>,
<B,C>, <C,D>, <D,B>,
<D,A>, <E,C> }

图的定义

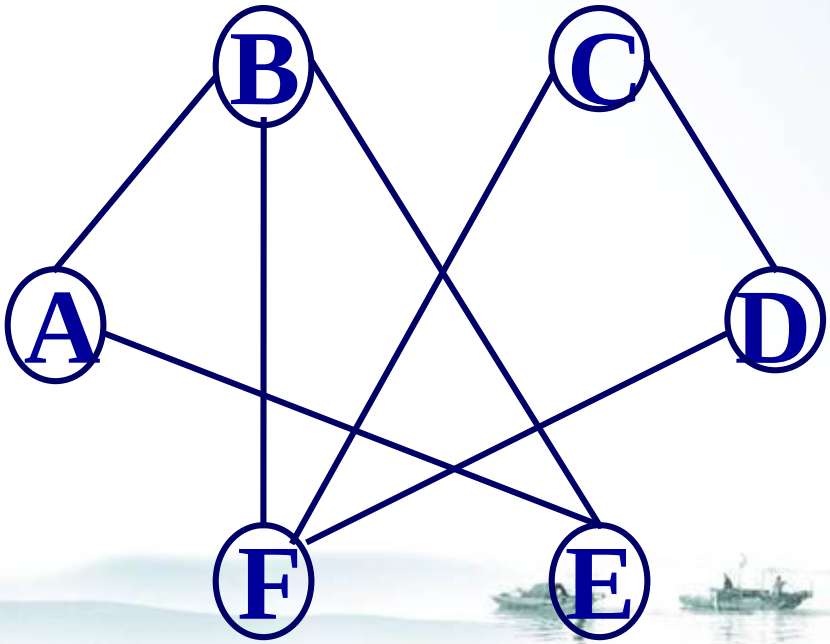
例如: $G_2=(V_2,E_2)$

$V_2=\{A, B, C, D, E, F\}$

$E_2=\{(A,B), (A,E),$

$(B,E), (C,D), (D,F),$

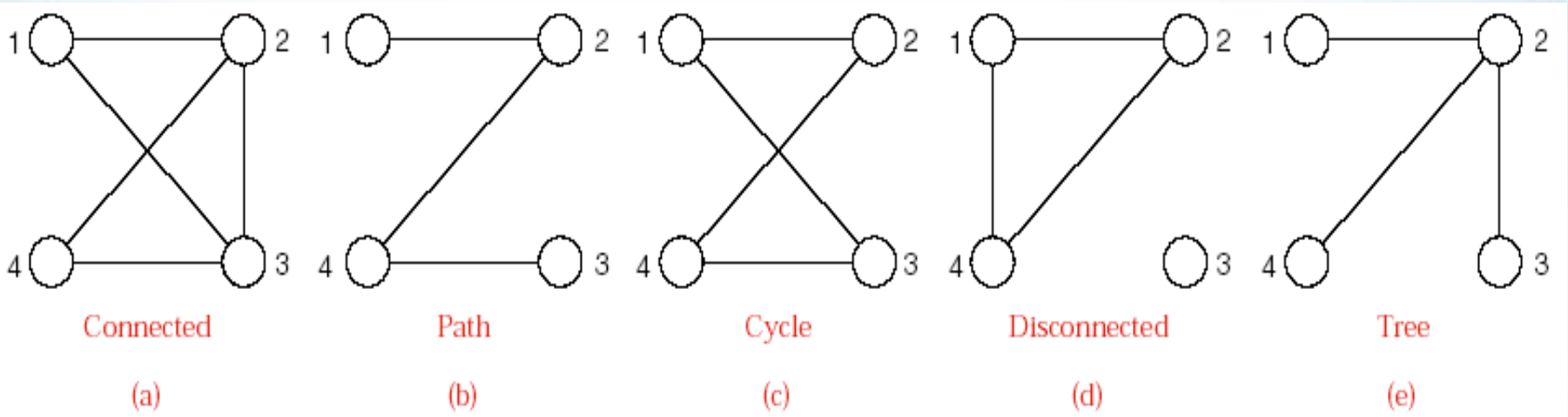
$(B,F), (C,F)\ \}$



图的定义

- Two vertices in an undirected graph are called *adjacent(邻接的)* if there is an edge from the first to the second.
- A *path(路径)* is a sequence of distinct vertices, each adjacent to the next.
- A *cycle(回路)* is a path containing at least three vertices such that the last vertex on the path is adjacent to the first.
- A graph is called *connected(连通的)* if there is a path from any vertex.
- A free tree*(自由树)* is defined as a connected undirected graph with no cycles. n个顶点，n-1条边，连通没有回路。
- n个顶点的连通图中，至少含有n-1条边。

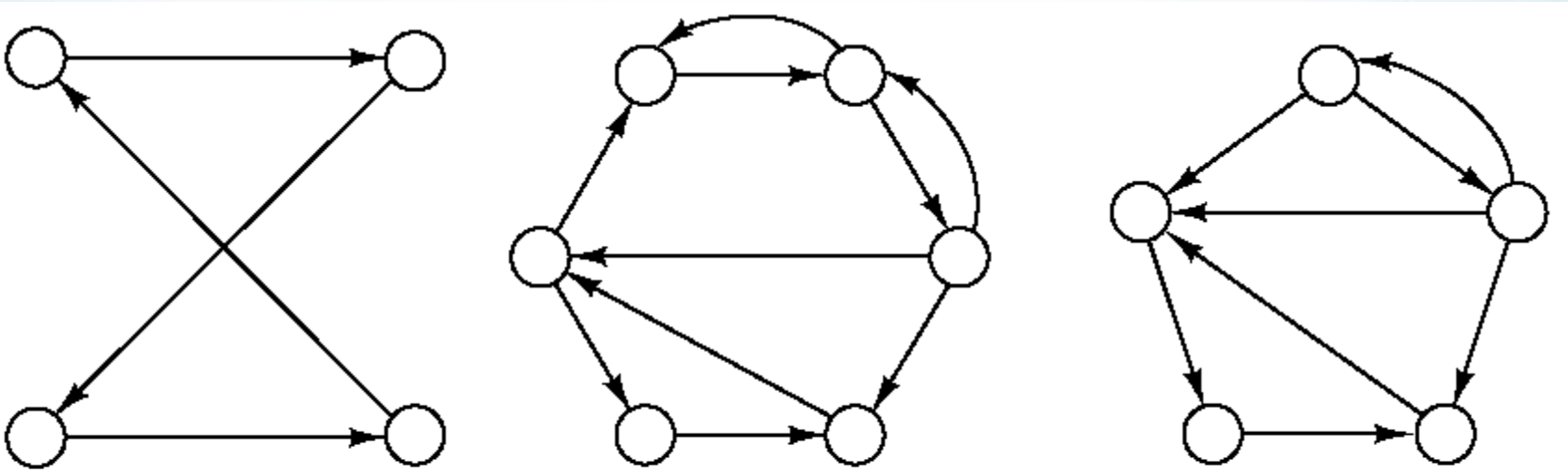
图的定义



图的定义

- In a directed graph a path or a cycle means always moving in the direction indicated by the arrows. Such a path (cycle) is called a *directed* path (cycle).
- A directed graph is called *strongly connected(强连通的)* if there is a directed path from any vertex to any other vertex. If we suppress the direction of the edges and the resulting undirected graph is connected, we call the directed graph *weakly connected(弱连通的).*
- The *valence(阶,度)* of a vertex is the number of edges on which it lies, hence also the number of vertices adjacent to it.
- 所有顶点的度数之和是边数的2倍。

图的定义



Directed cycle

(a)

Strongly connected

(b)

Weakly connected

(c)