

Graph Theory

- A graph is a pair of sets $G = (V, E)$
Where V is a vertex set, and E is an edge set
- Where $E \subseteq V^2$ 2-element subsets of V
 $V = \{1, 2, 3, 4, 5, 6\}$
 $E = \{12, 14, 23, 24, 25, 26, 35, 36, 45, 56\}$
- notation: $x \text{-----} y$
 $\{y, x\} = \{x, y\} = xy = yx$
- x is adjacent to y
- x is incident with xy
- xy joins x to y
- x and y are the ends of xy
- a Path from $x \in V$ to $y \in V$ is a segment of Vertices
- $x = V_0, V_1, V_2, V_3, V_4, \dots, V_K$
in which successive Vertices are adjacent, and no vertices are repeated (except possibly $x=y$).
length = #adjacent traversed
- A Path of length at least 3, with $x=y$ is called a cycle
Note: $\{x, x\} = \{x\}$ IS NOT ALLOWED
 $\{x, y\} = \{x, y\}$
- A graph (G) is called CONNECTED iff for all $x, y \in V$
- A subgraph H of G is a graph H within
 $V(H) \subseteq V(G)$
 $E(H) \subseteq E(G)$
- $(\{1, 2, 3\}, \{12\})$ 1-----2 3
Graph!
- A graph G is called acyclic iff it contains no cycles.
- A subgraph H of G is called a connected component G IFF
 1. H is connected
 2. is maximal
- THM: let T be a tree on N vertices, then T has $n-1$ edges