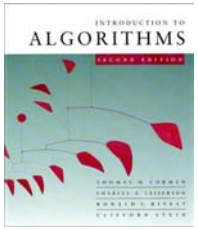
CS 5633 -- Spring 2006



Minimum Spanning Trees

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Slides courtesy of Charles Leiserson with changes and additions by Carola Wenk

Adjacency-list representation

Handshaking Lemma:

- For undirected graphs:
  $\sum_{v \in V} degree(v) = 2|E|$
- For digraphs:
  $\sum_{v \in V} in\text{-}degree(v) + \sum_{v \in V} out\text{-}degree(v) = 2 \mid E \mid$

$\Rightarrow$ adjacency lists use $\Theta(|V| + |E|)$ storage
$\Rightarrow$ a ***sparse*** representation

Minimum spanning trees

Input: A connected, undirected graph $G = (V, E)$ with weight function $w : E \to \mathbb{R}$.

- For simplicity, assume that all edge weights are distinct. (CLRS covers the general case.)

Output: A ***spanning tree*** T — a tree that connects all vertices — of minimum weight:

$$w(T) = \sum_{(u,v) \in T} w(u,v).$$

Example of MST