Chapter 6 Section 2 MA1020 Quantitative Literacy

Sidney Butler

Michigan Technological University

November 29, 2006

#### Example

You remember that you need to return a DVD to the rental store. The store is 2.5 blocks from the office and the bank, 4.5 blocks from the sandwich shop, and 1.5 blocks from the post office. Draw a weighted graph.

- Weighted Graph
- Weight

#### Example

A Midwestern commuter airline provides services between Cleveland (CL), Chicago (Ch), Minneapolis (M), and St. Louise (StL). The distance, in miles, between the cities is listed in the following table.

Cities	CL	Ch	М	StL
CI	_	335	740	530
Ch	335		405	290
М	740	405	_	550
StL	530	290	550	—

- **1** Draw a weighted graph to represent the commuter airline network.
- Remove redundant edges until the graph no longer contains a circuit. Draw the resulting subgraph.

#### Definition

A tree is a connected graph that has no circuits.



### Trees

#### Definition

A spanning tree is a subgraph that contains all the vertices of a graph, is connected and contains no circuits.



#### Definition

A minimal spanning tree is a spanning tree with the smallest possible weight.

S Butler (Michigan Tech)

Chapter 6 Section 2

# Kruskal's Algorithm for Finding a Minimal Spanning Tree in a Weighted Graph.

- **1** Consider only the vertices of the weighted graph.
- 2 Select the edge with the smallest weight and add that to the subgraph.
- 3 Consider the acceptable edges and choose the edge with the smallest weight. Add that to the subgraph.
- 4 Determine whether all vertices are connected by a path. If so, you have a minimal spanning tree. If not, repeat step 3.

## Example



© 2007 Thomson Higher Education



## #4, 12, 16, 20, 28