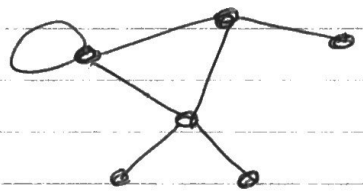
Introduction to CSI 35

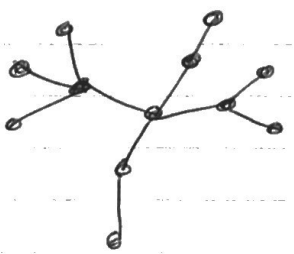
In this course we study basic mathematical structures and their properties. We'll see they have many useful applications.

In Chapter 10 we study graphs which are vertices (dots) connected by edges (lines) such as



This could represent a network of some kind.

A special kind of graph is a tree

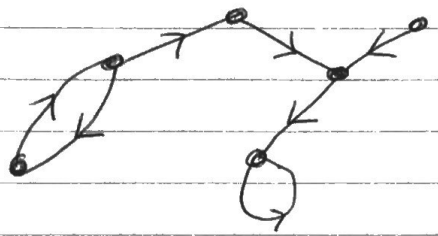


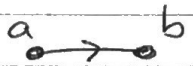
no cycles

Chapter 11.

Graphs, trees and functions are all special cases of relations which we look at in Chapter 9.

In fact relations on a set are the same as directed graphs where the edges have arrows



and  means a is related to b.

In Chapter 5 we look at induction and recursion.

For example the Fibonacci numbers are defined recursively by:

$$f_0 = 0, \quad f_1 = 1 \quad \text{and} \quad f_{n+1} = f_n + f_{n-1} \quad n \geq 1$$

so $f_2 = 1$, $f_3 = 2$, $f_4 = 3$, $f_5 = 5$, ...

Induction is a method of proving things.

For example $f_1 + f_3 + \cdots + f_{2n-1} = f_{2n}$ may be proved by induction.

We can also use induction to prove that the number of vertices in any tree is always one more than the number of edges.