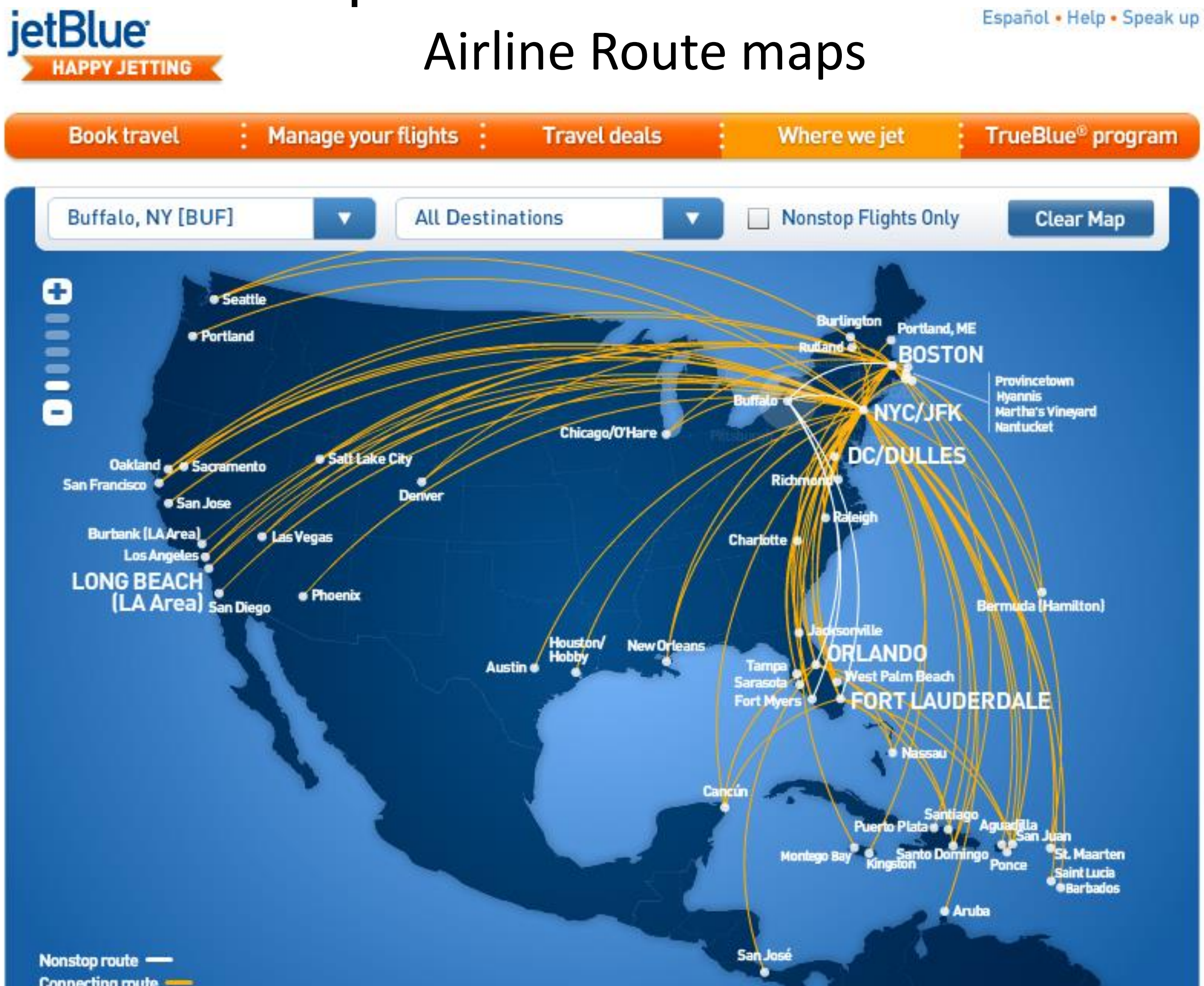
Lecture 11

CSE 331

Basic Graph definitions

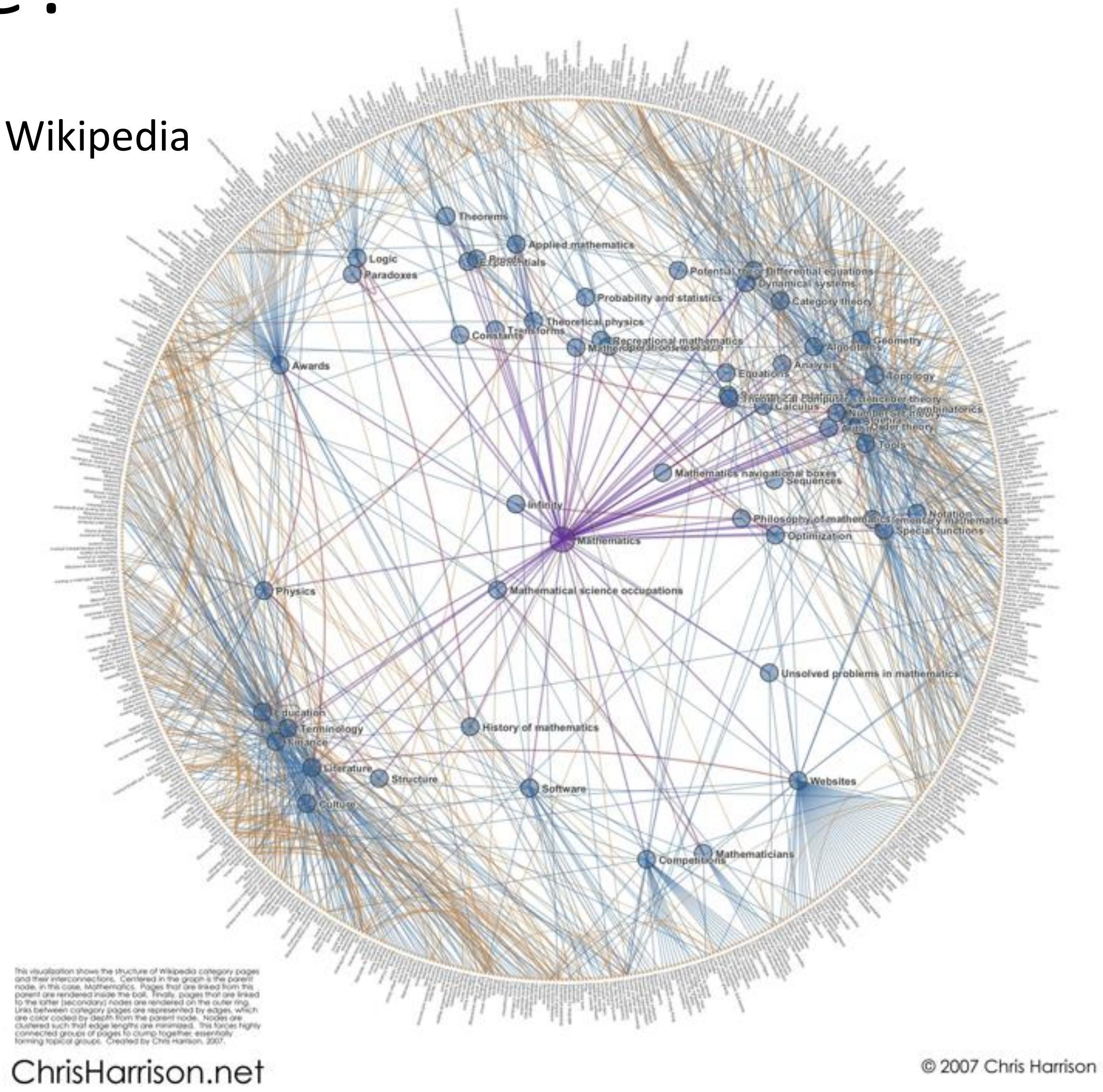
Graphs are omnipresent

Airline Route maps

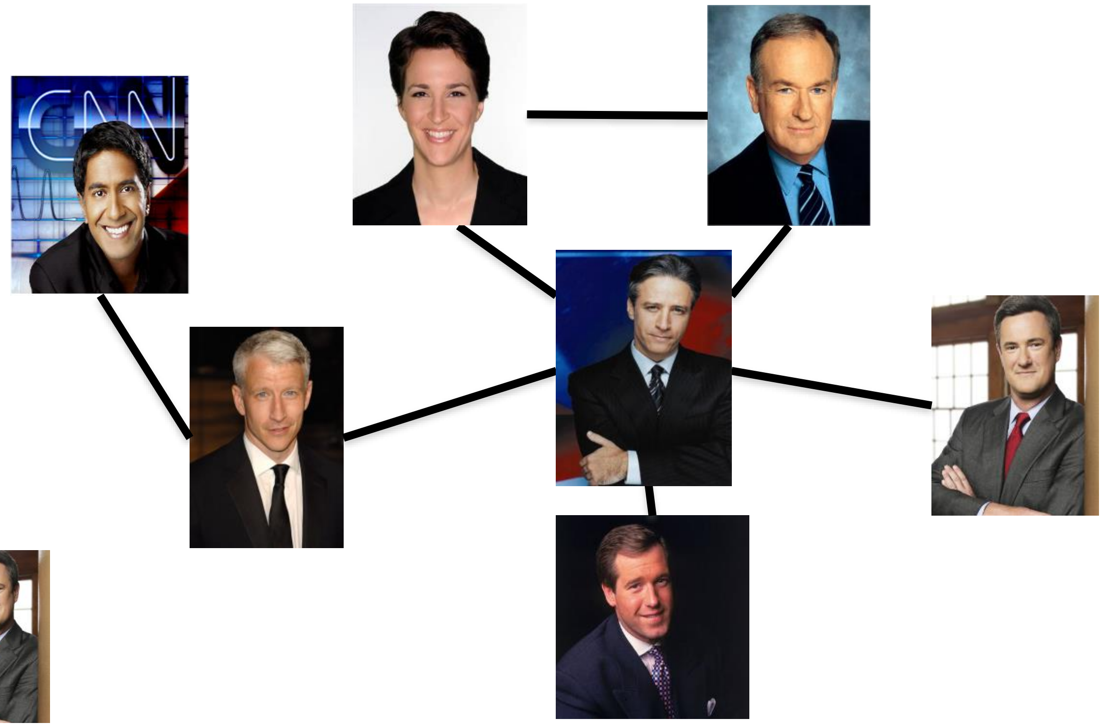


And this one?

Math articles on Wikipedia



Paths



Sequence of vertices connected by edges

Connected

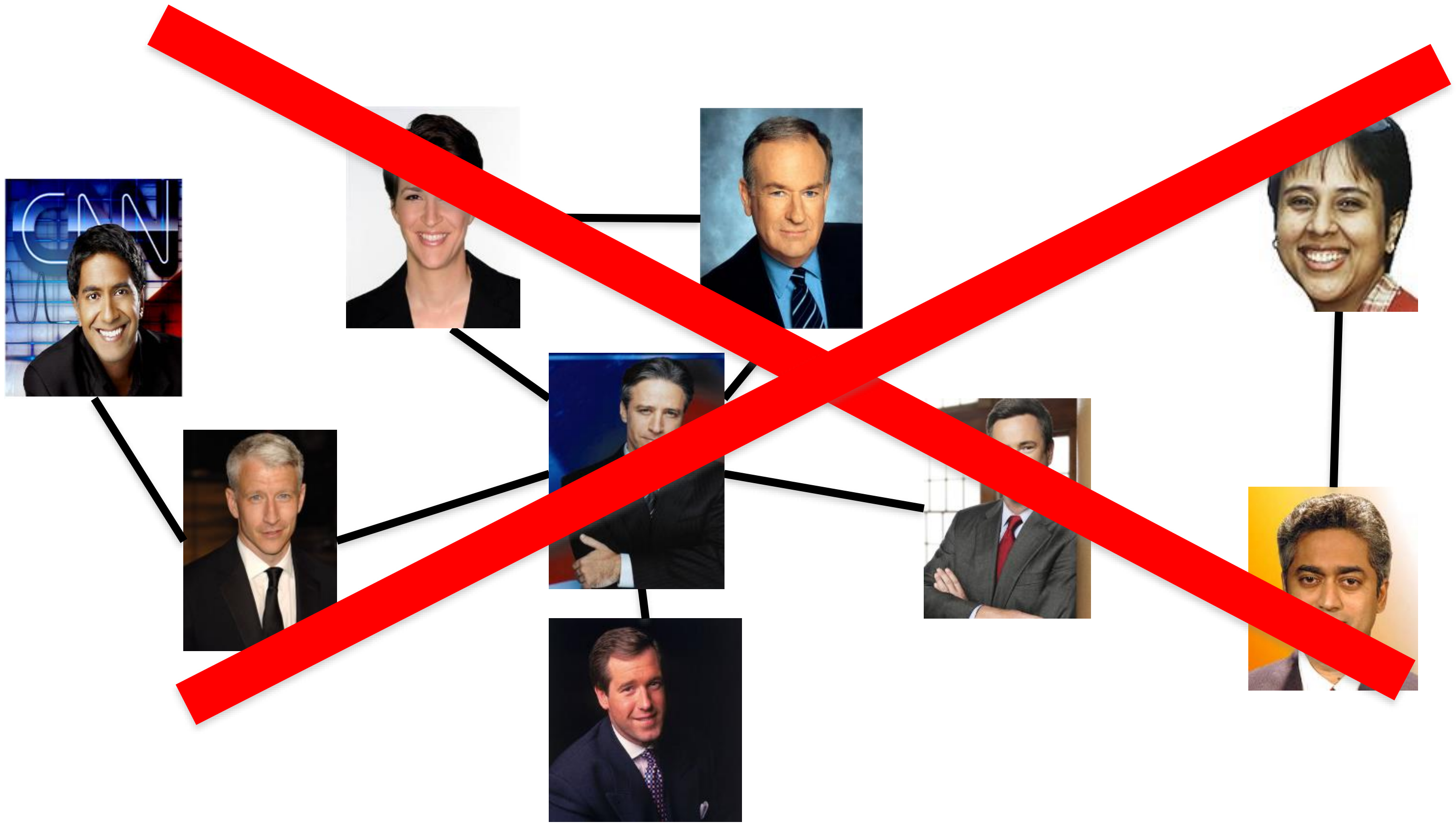
Path length 3

Connectivity

u and w are connected iff there is a path between them

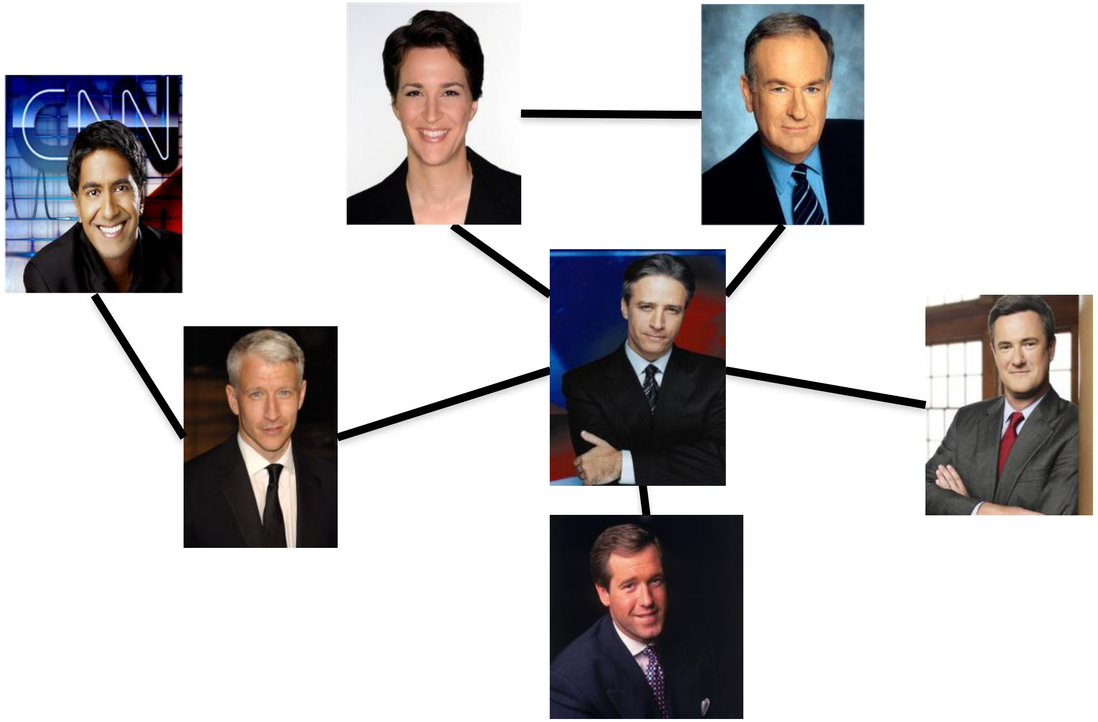
A graph is connected iff all pairs of vertices are connected

Connected Graphs



Every pair of vertices has a path between them

Cycles

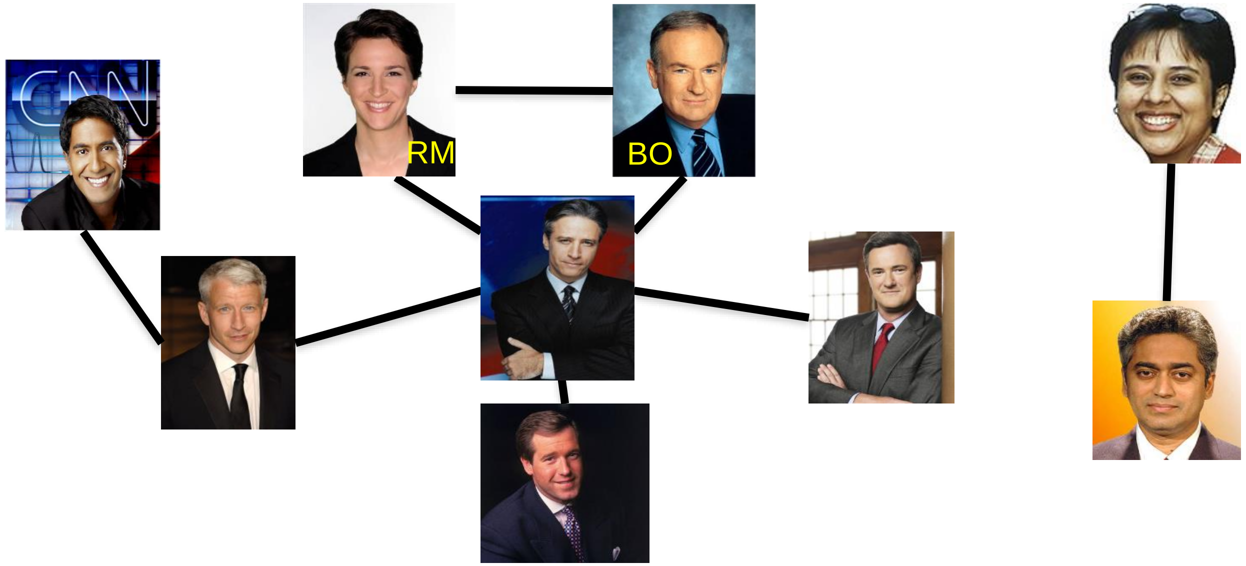


Sequence of k vertices connected by edges, first k-1 are distinct

Formally define everything

Distance between u and v

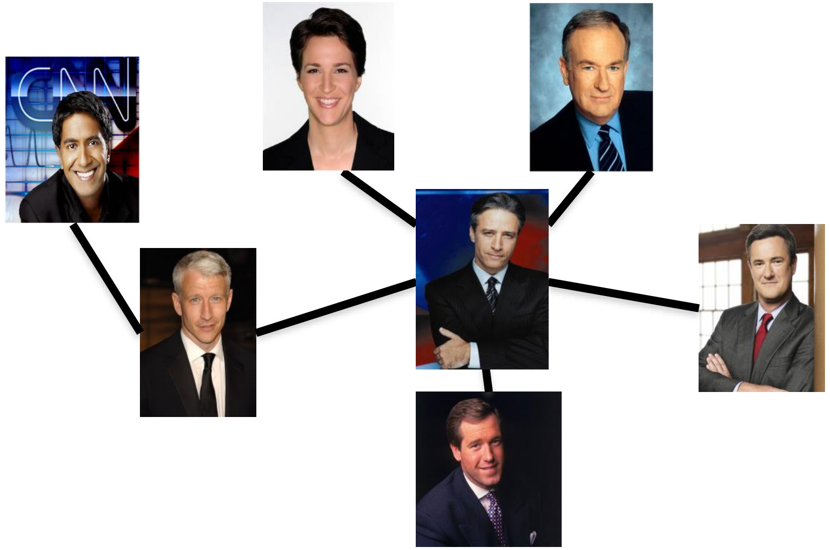
Length of the shortest length path between u and v

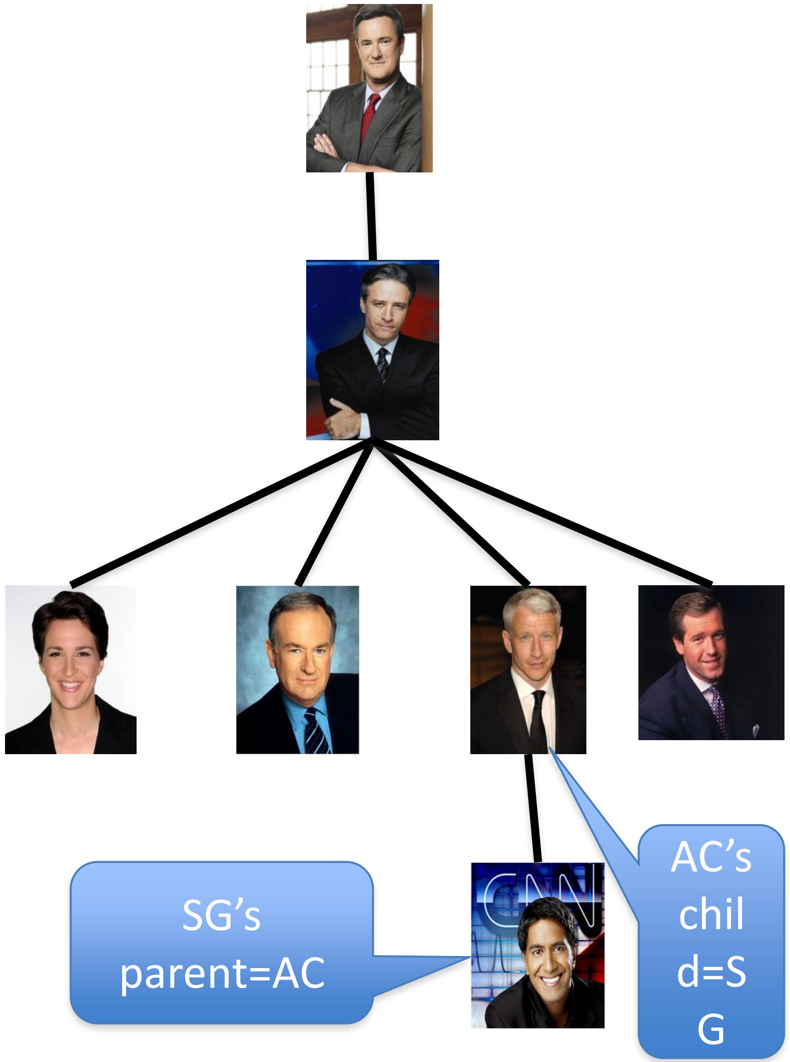


Distance between RM and BO? 1

Rooted Tree

A rooted tree





Pick any vertex as root

Let the rest of the tree hang under "gravity"

Every n vertex tree has n-1 edges

Trees

This page collects material from previous incarnations of CSE 331 on trees, especially the proof that trees with n nodes have exactly $n-1$ edges.

Where does the textbook talk about this?

`Section 3.1` in the textbook has the lowdown on trees.

Fall 2018 material

Here is the lecture video:

Every n vertex tree has n-1 edges

Let T be an undirected graph on n nodes

Then ANY two of the following implies the third:

T is connected

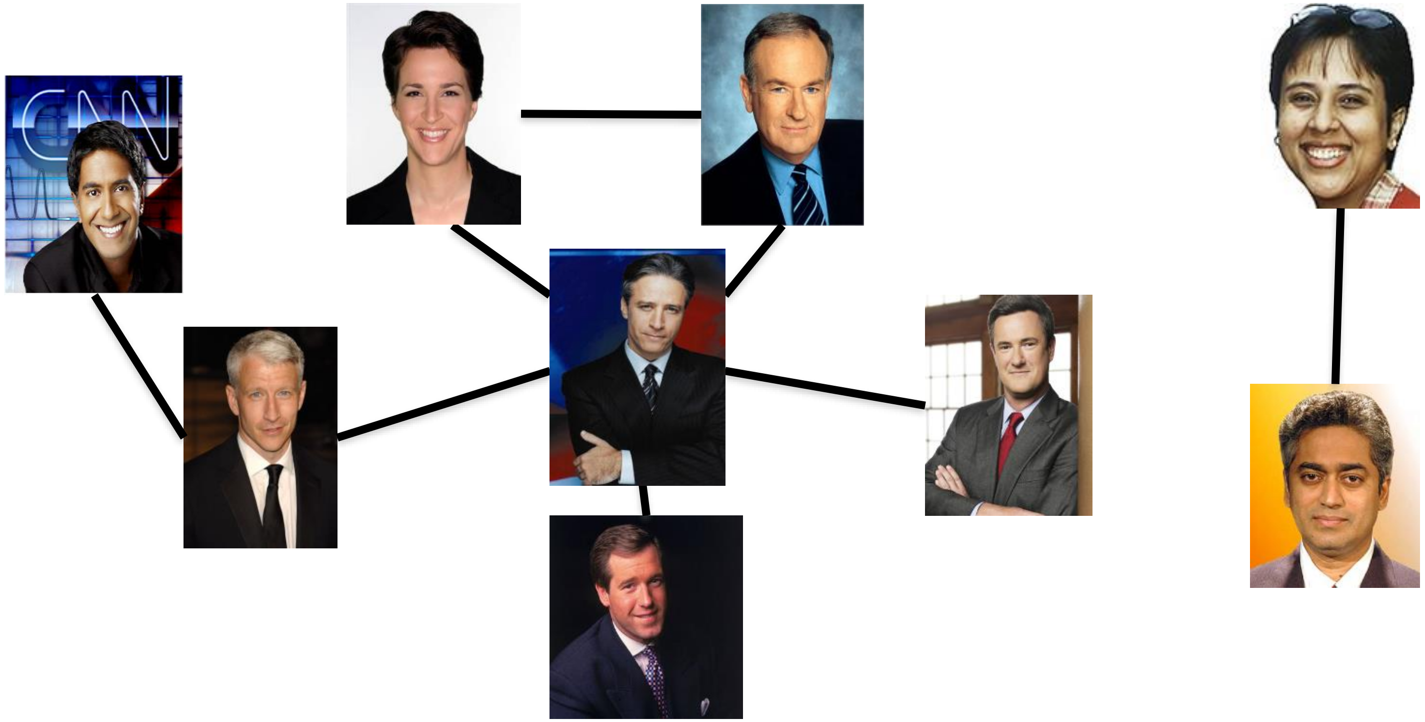
T has no cycles

T has n-1 edges

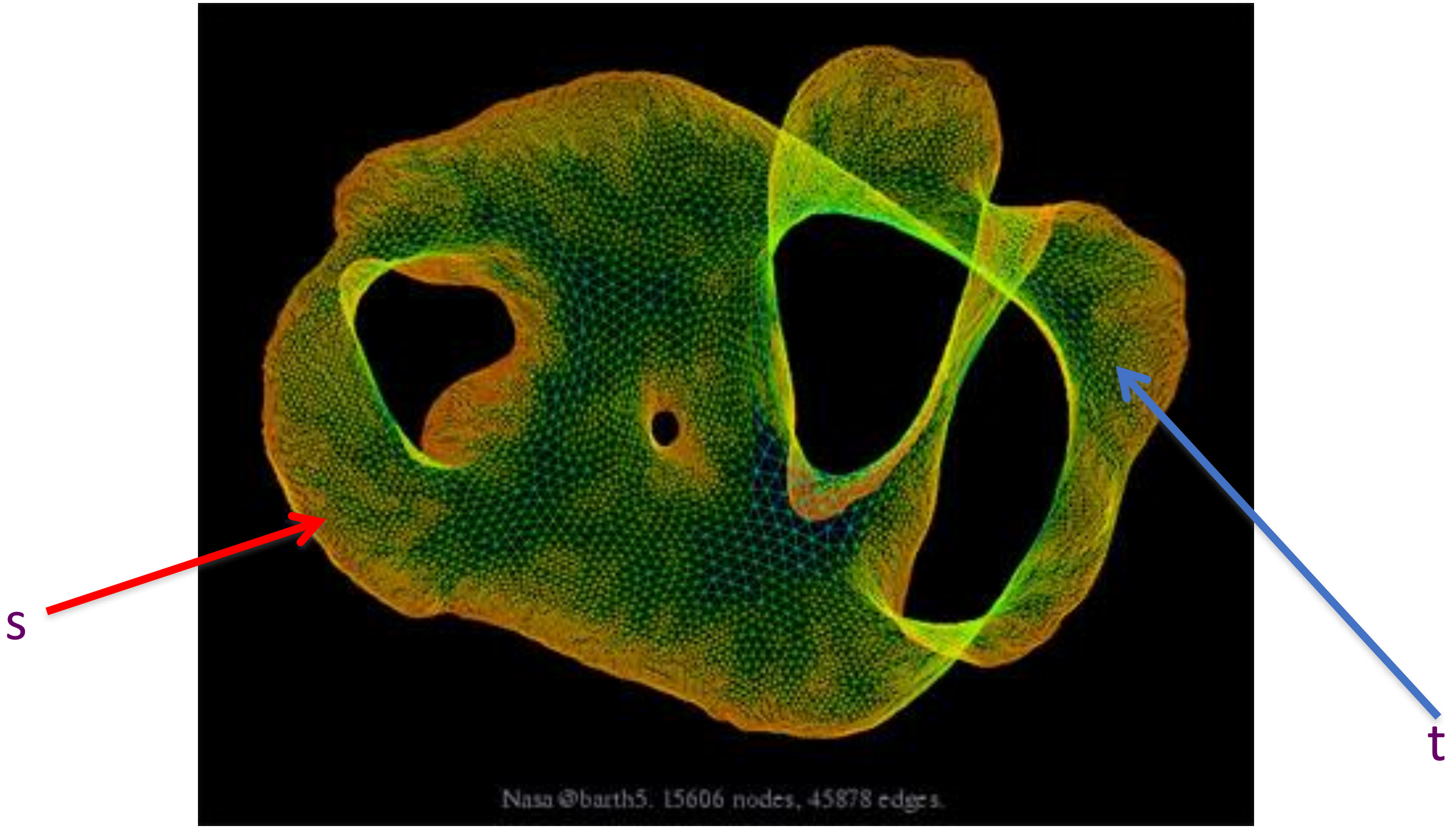
Rest of Today's agenda

Algorithms for checking connectivity

Checking by inspection



What about large graphs?



Are s and t connected?

Brute-force algorithm?

List all possible vertex sequences between s and t

n^n such sequences

Check if any is a path between s and t

Connectivity Problem

Input: Graph G = (V,E) and s in V

Output: All t connected to s in G

Connected component of s