Proof of the Day:

Prove by induction that the number of binary strings of length k is 2^k.

For example:

The 8 binary strings of length 3 are:

000, 001, 010, 011,
100, 101, 110, 111

Note that $8 = 2^3$.

For participation credit today you have to hand something in with your name on it.

Prove by induction that the number of binary strings of length k is 2^k.

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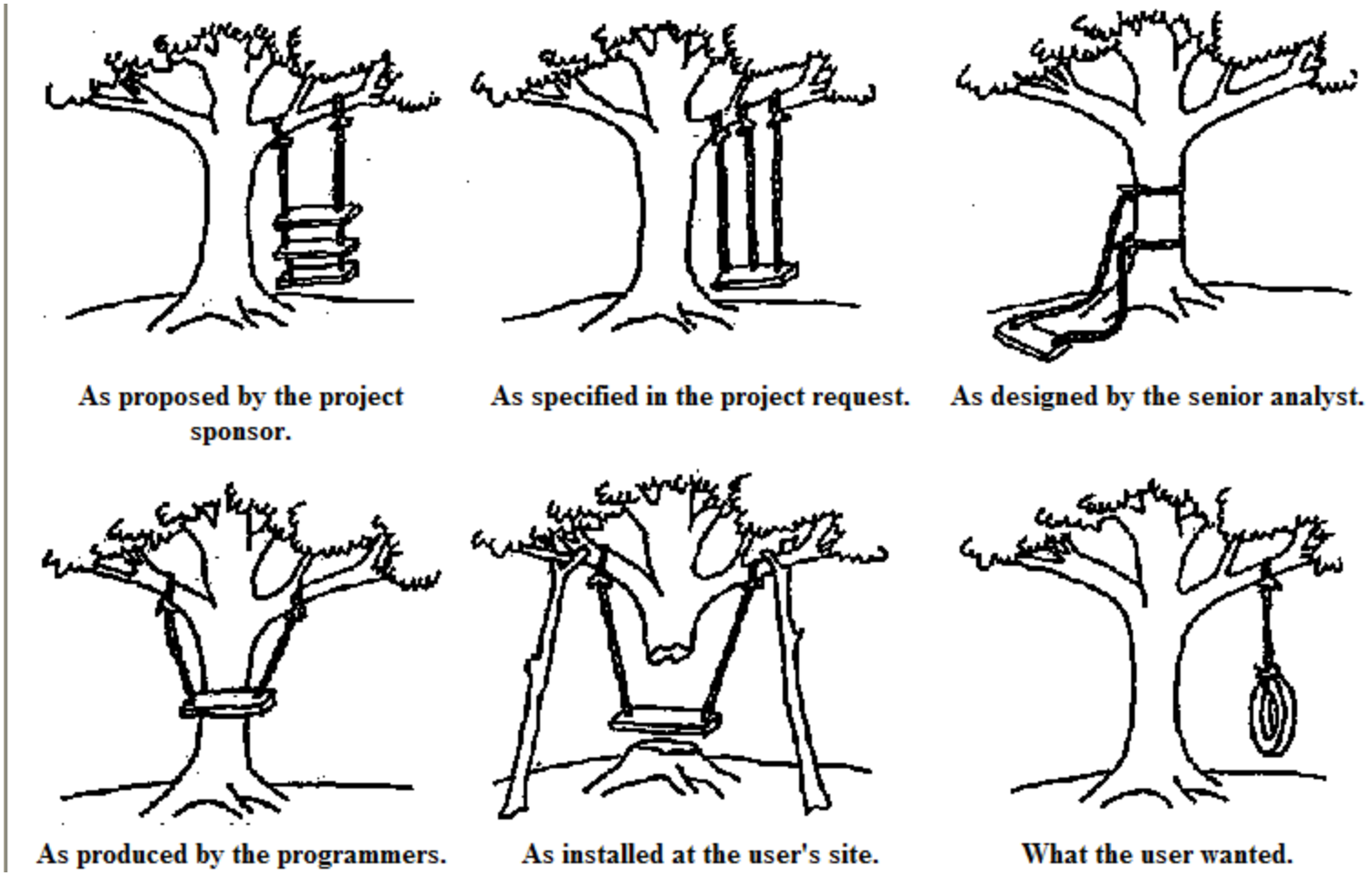
100, 101, 110, 111

Note that $8 = 2^3$.

For participation credit today you have to hand something in with your name on it.

CSC 225: Design and Analysis of Algorithms

Dr. Wendy Myrvold, ECS 552, wendym@csc.uvic.ca



Cartoon from: http://www.uoregon.edu/~ftepfer/SchlFacilities/TireSwingTable.html

Class Materials and Announcements

Connex: calendar, electronic assignment submission (for programs), feedback on electronic submissions, links to assignments and tutorials on class web pages, model solutions and other private class resources, sending e-mail announcements to the class.

If you have connex? next to your name on the class signature list, this means I did not see your name on Tuesday on the class roster.

Course web pages: office hours, assignments, tutorials, projected schedules, class notes, old exams, study aids. No password required to access, accessible when connex is down.

Announcements

Lab #1 is posted: due Monday Sept. 9.

Assignment #1:

Part 1A Written Questions: Hand in on paper at the beginning of class on Fri. Sept. 20.

Part 1B Programming Questions: Upload to connex by Tues. Sept. 24 at midnight.

It's better to hand in a partially completed assignment then to hand in nothing at all. You must pass the assignments to pass the course.

Next Wednesday- bring schedule to class to help me in selecting office hours.

Make sure you sign the attendance sheet today to get credit for attending.

Powerpoint slides will be posted: click on the "Selected class notes" link on the course web page.

Lab starts next Monday Sept. 9.
Try to complete the exercises posted before attending the lab. Attend the lab even if you do not find time to complete everything beforehand.

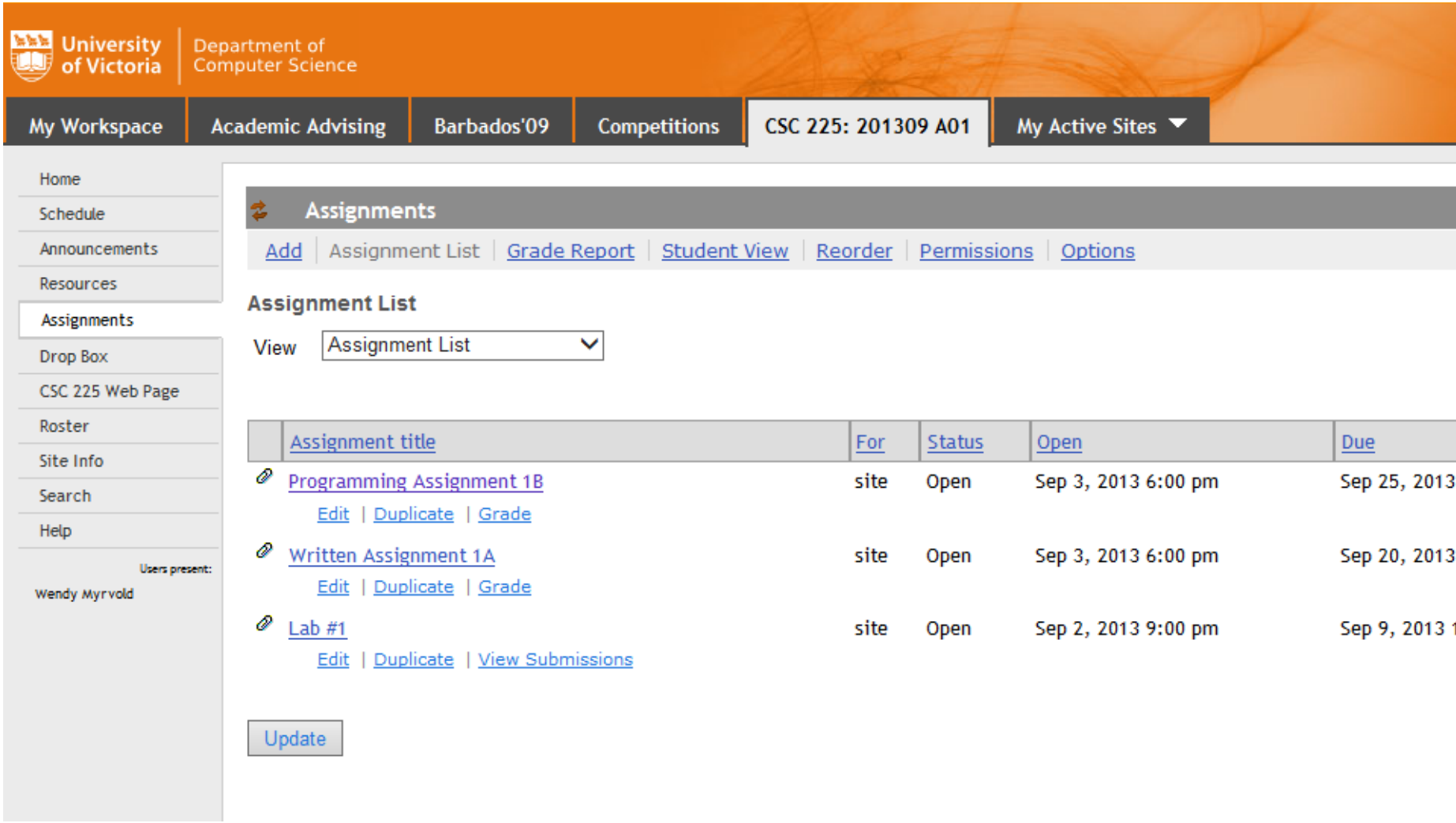
Lab sections:

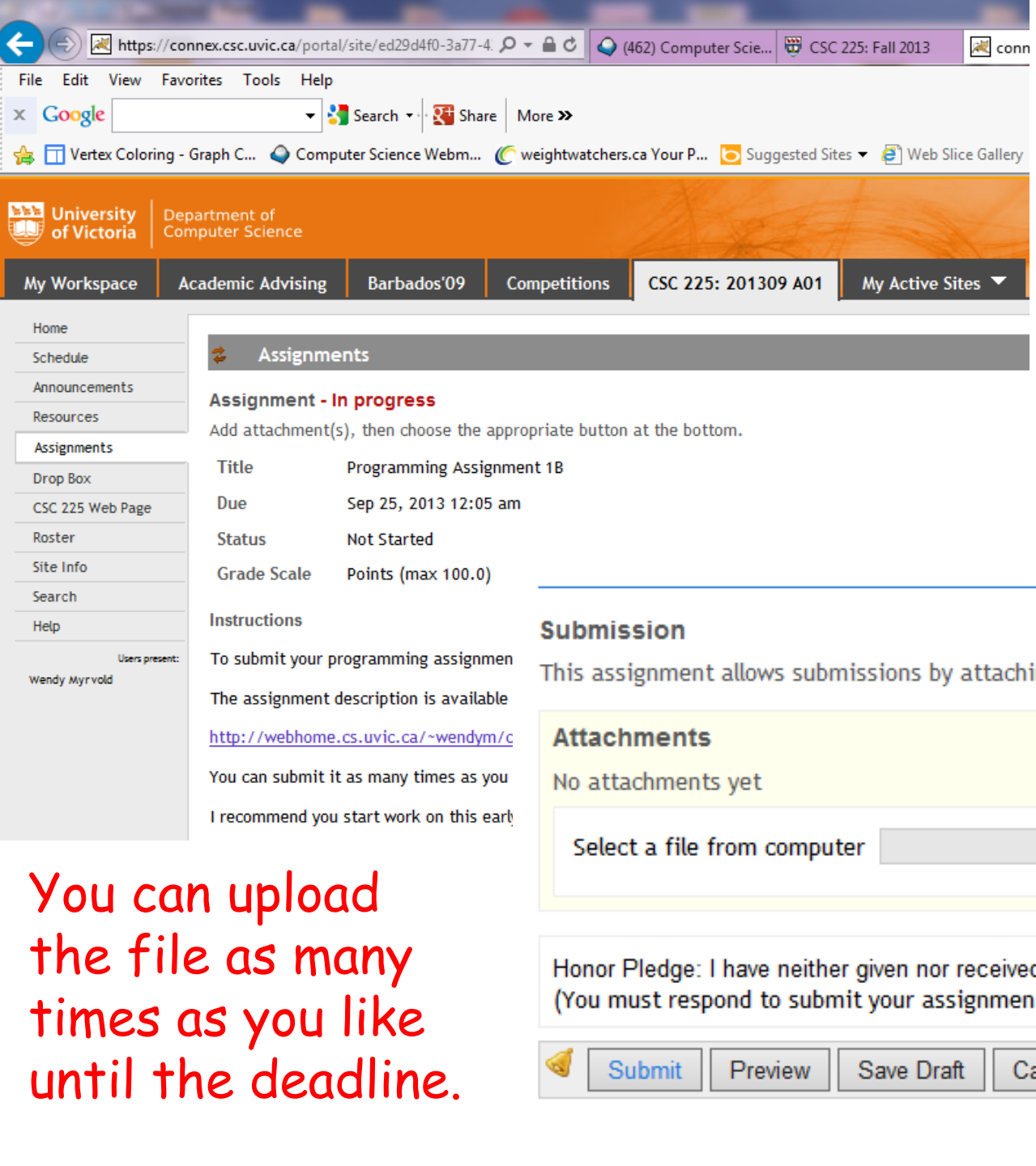
This section has been moved to a bigger room:

(B01) M 12:00 NEW ROOM: Cornett B 107

This section conflicts with CSC 230:

(B02) M 1:00 Cornett A 129


University of Victoria
Department of Computer Science
My Workspace
Academic Advising
Barbados'09
Competitions
CSC 225: 201309 A01
My Active Sites
Home
Schedule
Announcements
Resources
Assignments
Drop Box
CSC 225 Web Page
Roster
Site Info
Search
Help
Users present:
Wendy Myrvold
Assignments
Add | Assignment List | Grade Report | Student View | Reorder | Permissions | Options
Assignment List
View Assignment List
Assignment title | For | Status | Open | Due
Programming Assignment 1B | site | Open | Sep 3, 2013 6:00 pm | Sep 25, 2013 12
Edit | Duplicate | Grade
Written Assignment 1A | site | Open | Sep 3, 2013 6:00 pm | Sep 20, 2013 11
Edit | Duplicate | Grade
Lab #1 | site | Open | Sep 2, 2013 9:00 pm | Sep 9, 2013 12:0
Edit | Duplicate | View Submissions
Update



You can upload your programs at the bottom of the assignment page. Submit 1 file:

LinkedList.java

You can upload the file as many times as you like until the deadline.

Important Announcements from Jane Guy

CSC 225 Prerequisites: CSC 115 or 160, and MATH 122 or CENG 245
If you do not have the prerequisites you should drop the class now to avoid paying for it.

If you are repeating a course for the 3rd or even the 4th time you must ask for permission to do so.
A form to apply for permission is available at the Computer Science Advising Centre ECS 514.

Questions: See Jane Guy, ECS 512

Outline for Lecture 1

- Who is the instructor?
- My research interests
- Logistics for CSC 225- the critical points are included on the course outline
- Brief overview of course content- don't worry about taking notes today

About me:

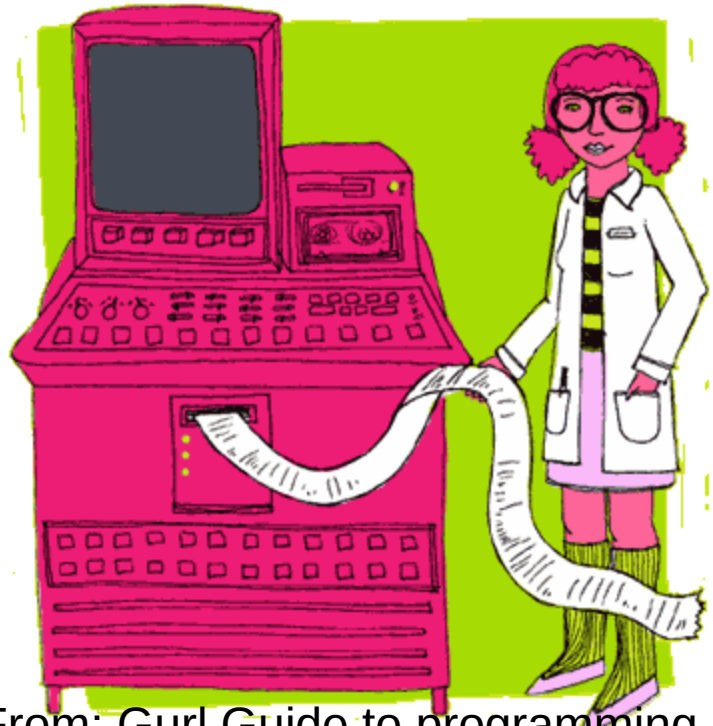
by Mark A. Hicks, illustrator.

B.Sc. : Computer Science, McGill University, 1983

M.Math. : Combinatorics and Optimization, University of Waterloo, 1984

Ph.D. in Computer Science: Waterloo, 1988

University of Victoria: started in 1988, currently a full professor



From: Gurl Guide to programming

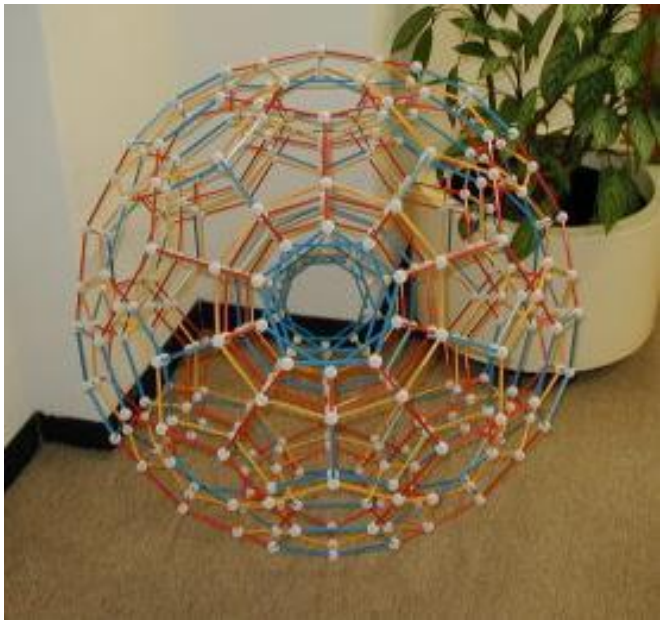
Bring your parents to work day at Google.

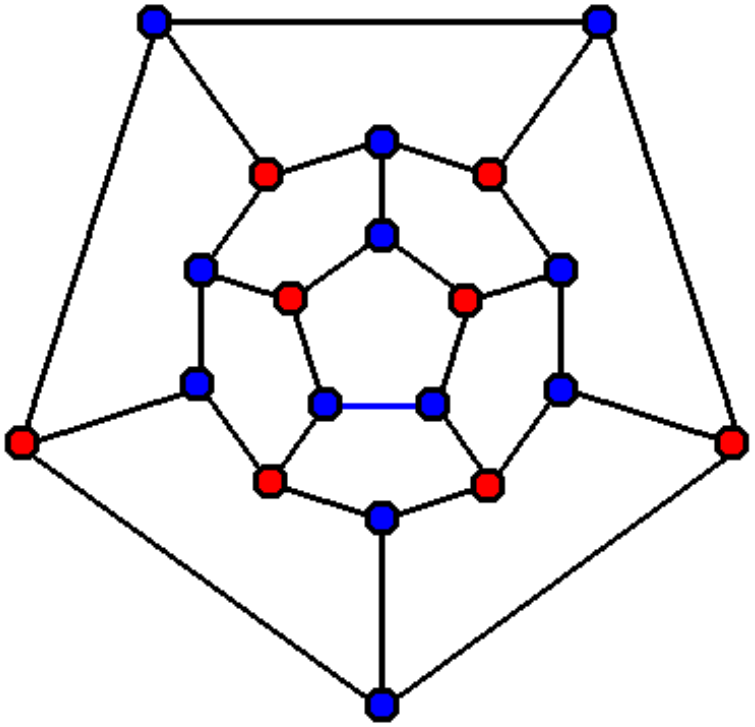

M
CCM

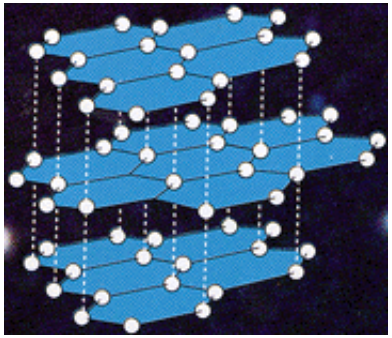
My Research: Large Combinatorial Searches

Independent Set:

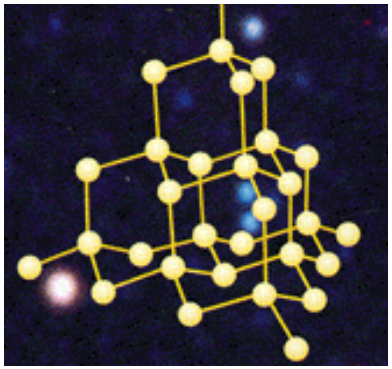
Set of vertices which are pairwise non-adjacent



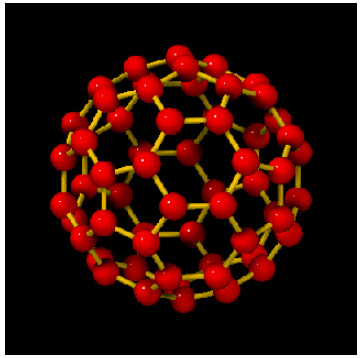




Graphite



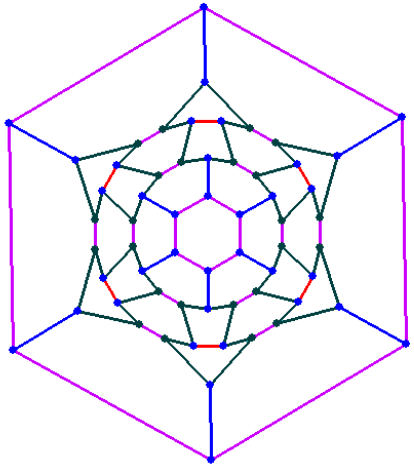
Diamond

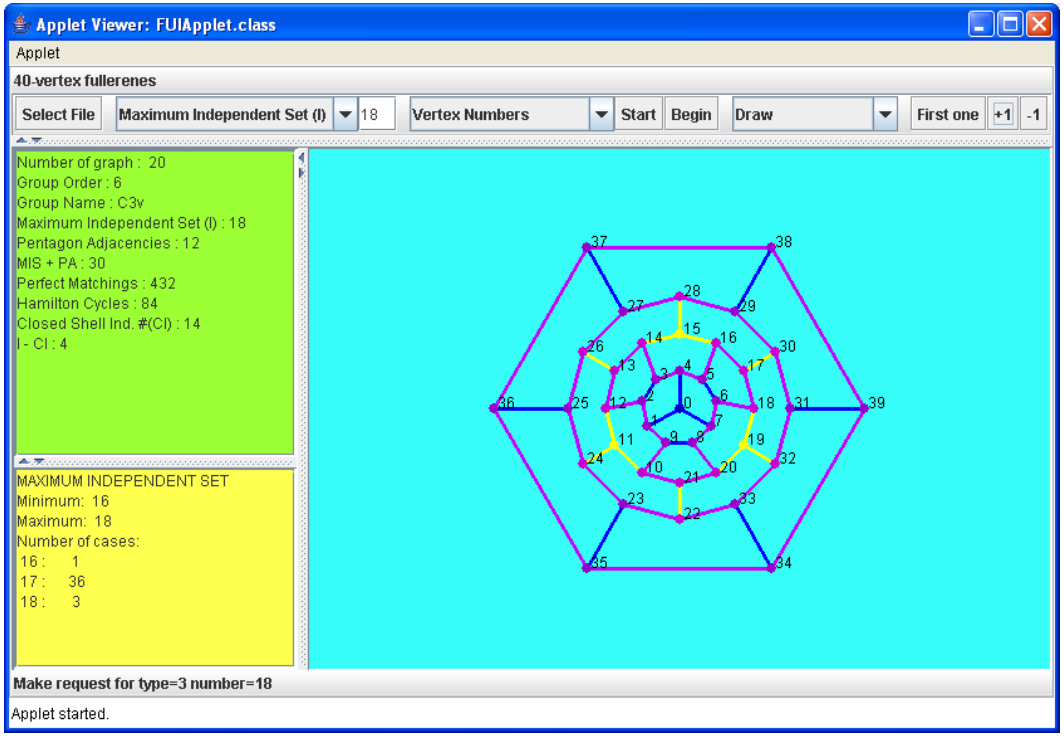


Fullerene

Fullerenes:

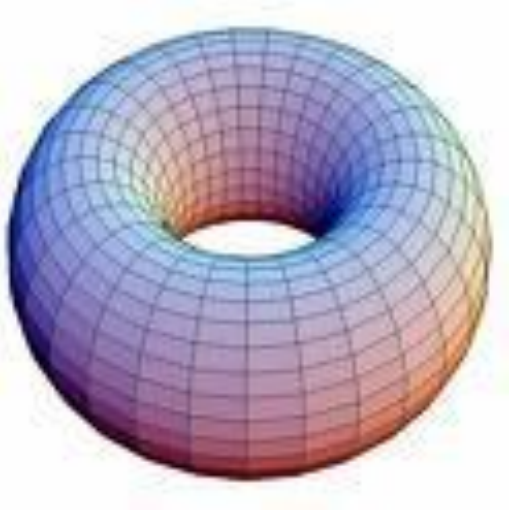
Working with Patrick Fowler (chemist)

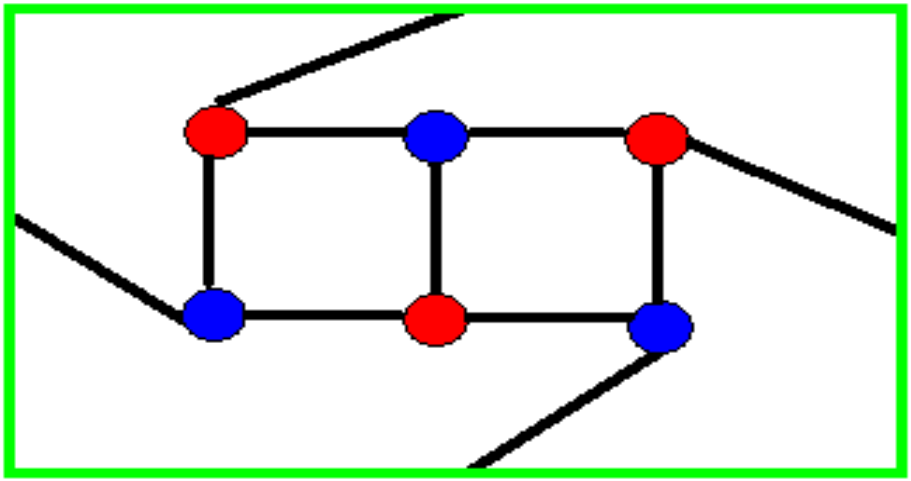


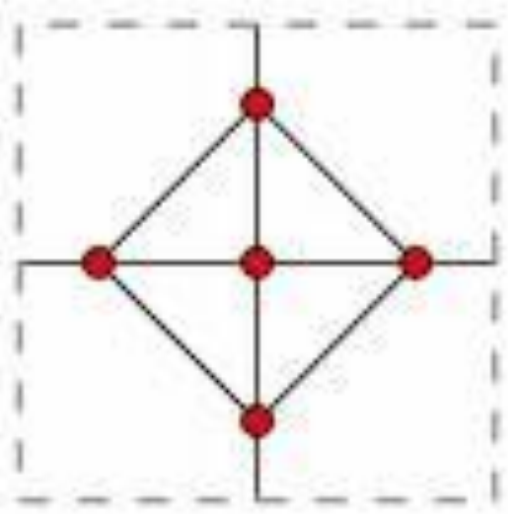


Topological Graph Theory:

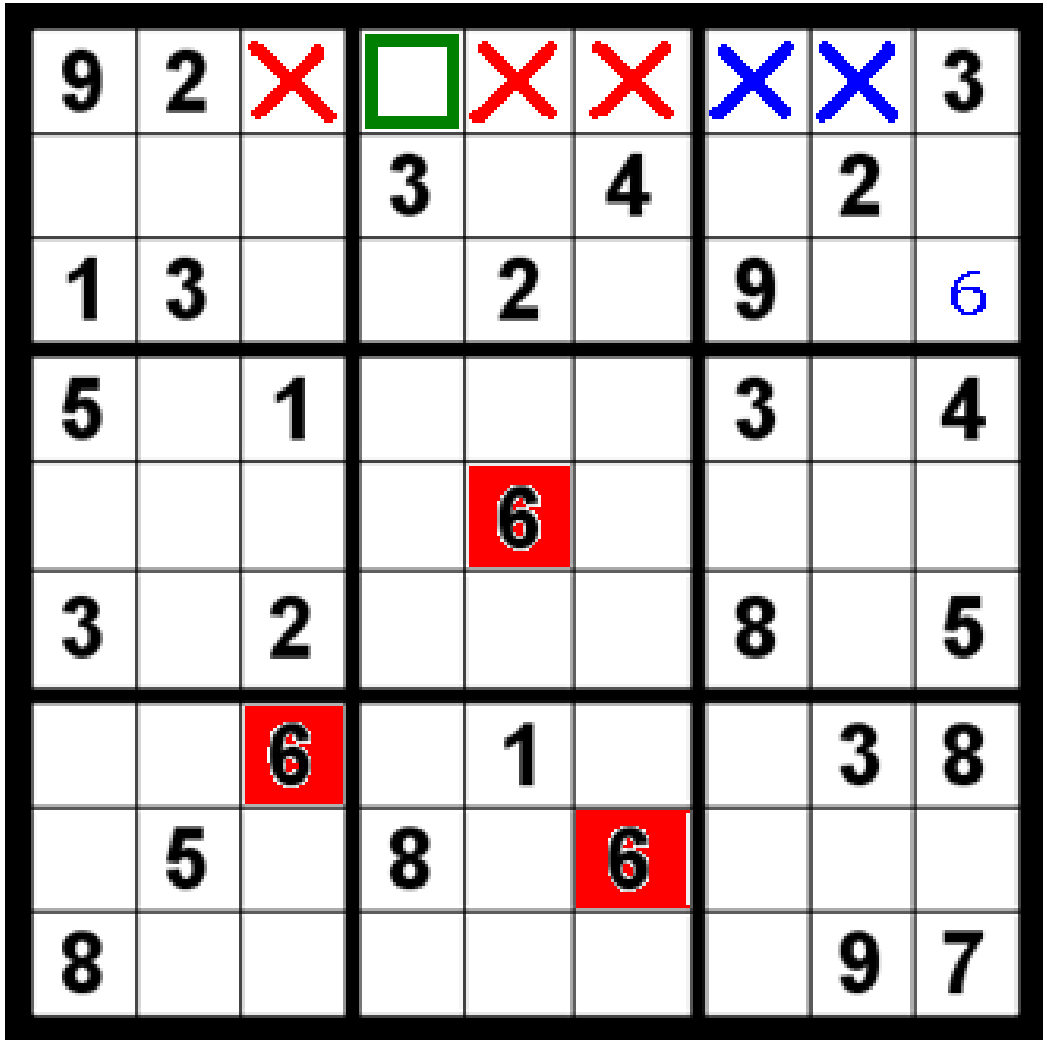
Algorithms and Obstructions





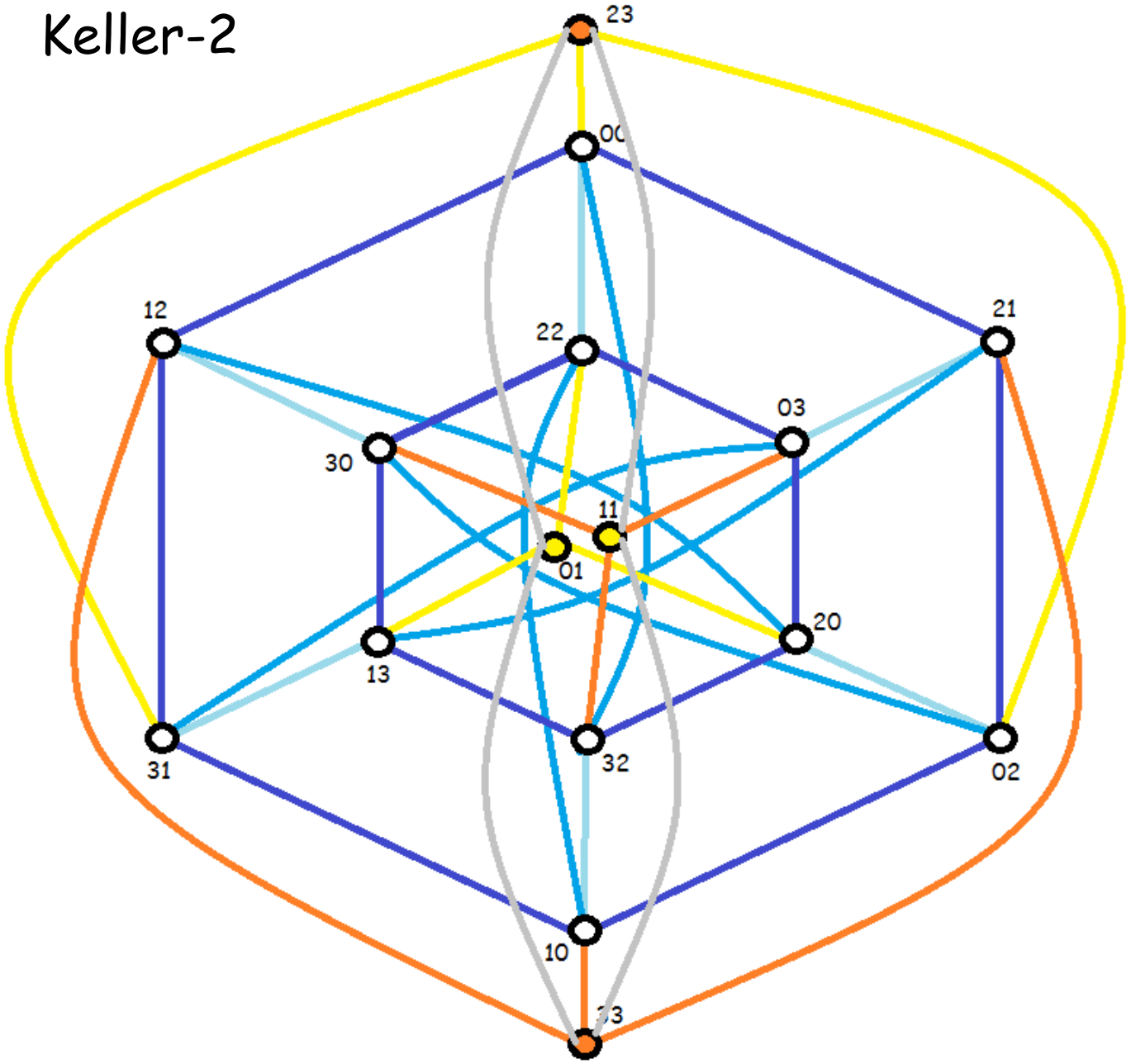


Latin Squares



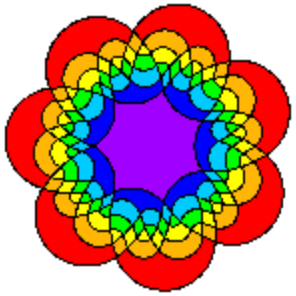
Please come talk to me if you are looking for Honours project research topics or for an NSERC undergraduate research project.

Keller-2



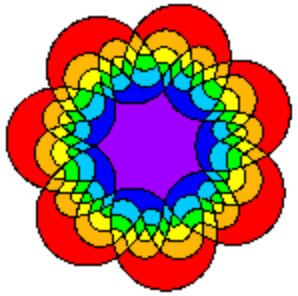
Found the maximum clique order in Keller-7.

Interested in coloring the complements of Keller-5, Keller-6, and Keller-7.



COMBINATORIAL ALGORITHMS GROUP
University of Victoria

http://www.cs.uvic.ca/~wendym/cag



Our research interests include:

Graph Theory and Graph Algorithms
Combinatorics
Combinatorial Algorithms
Computational Geometry
Randomized Algorithms
Computational Complexity
Network Reliability
Topological Graph Theory
Computational Biology
Cryptography
Design Theory

Join our listserv to get information about conferences and research talks.

Undergrads are welcome to all events.

CSC 225 Logistics

Course Website: http://www.cs.uvic.ca/~wendym/225.html

Instructor: Dr. Wendy Myrvold
Email: wendym@csc.uvic.ca

Office: ECS 552
Phone Number: 472-5783 (use e-mail for a faster response)
Office Hours: See course web page. For now: TWF 12:30-1:30pm or by apt.

I answer all student e-mails. If you do not get a response in a reasonable time frame please find out why the e-mail did not work.

Lecture Schedule: TWF 10:30 - 11:20 p.m. ECS 116

Projected Tutorial Schedule (total 7):
[Available from course web page]

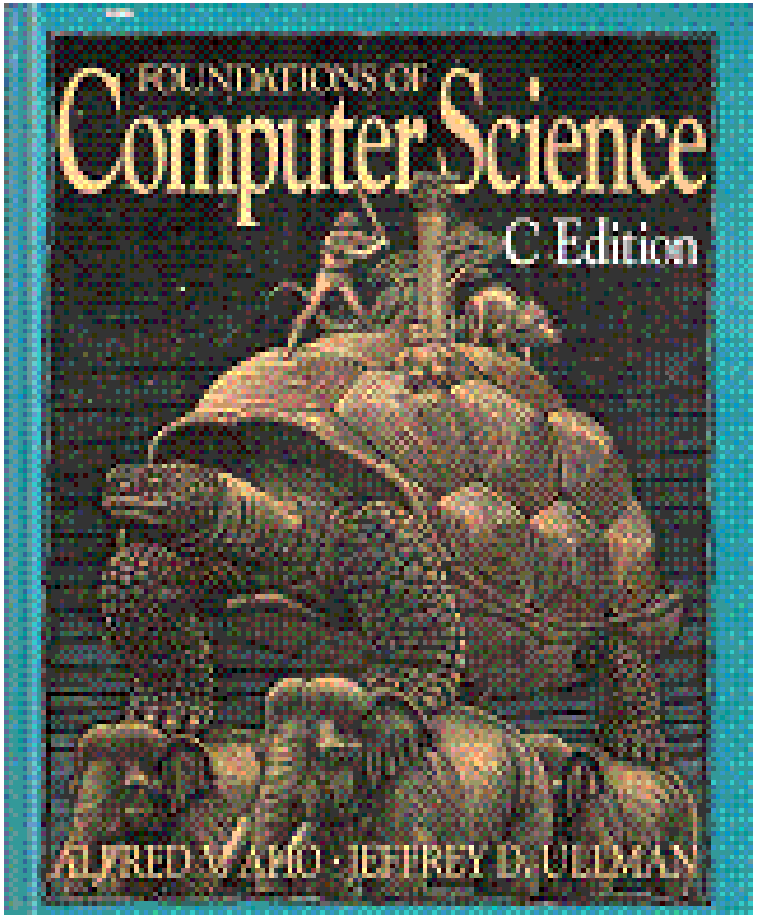
Lab #1: Monday Sept. 9.
Lab #2: Monday Sept. 16.
Lab #3: Monday Sept. 23.
Lab #4: Monday Sept. 30.
Lab #5: Monday Oct. 21.
Lab #6: Monday Nov. 18.
Lab #7: Monday Dec. 2.

Please take advantage of my office hours and e-mail support on weeks when we do not have a tutorial. Special sessions will be scheduled before the midterm and final exam.

If you want a free book:

"This book has been taken out of print by W. H. Freeman. You are welcome to use it if you like. We believed in 1992 it was the way to introduce theory in Computer Science, and we believe that today."

- Al Aho and Jeff Ullman



http://infolab.stanford.edu/~ullman/focs.html

Course Textbook:

Great pictures.
Elegant Java examples.
Theoretical precision.
Covers class material.

Algorithms, Fourth edition,
by Robert Sedgewick and Kevin Wayne,
Addison-Wesley, Toronto, 2011.

CSC 225 Grading

Written assignments	5	15%
Programming assignments	3	15%
Midterm	Wednesday Oct. 23	15%
Participation	Some classes and labs	5%
Final Exam	Scheduled by registrar	50%

You need a passing assignment average to write the final exam. Otherwise, your grade is N.

Keys to Success

Attend all classes and labs.

Do all your homework.

Come see me (early and often) if you need help. I love working with students. Ask questions in class as well.

Join a study group but prepare your final submissions independently.

Work old midterms and final exams as practice for your midterm and final.

Don't be afraid of generating incorrect solutions- real mathematicians make many mistakes in the process of creating new mathematics.

Paul Erdős

Come to class with your "brain open".

Try to understand what we are doing instead of memorizing things.

Be creative and make sense of things as you are solving problems.

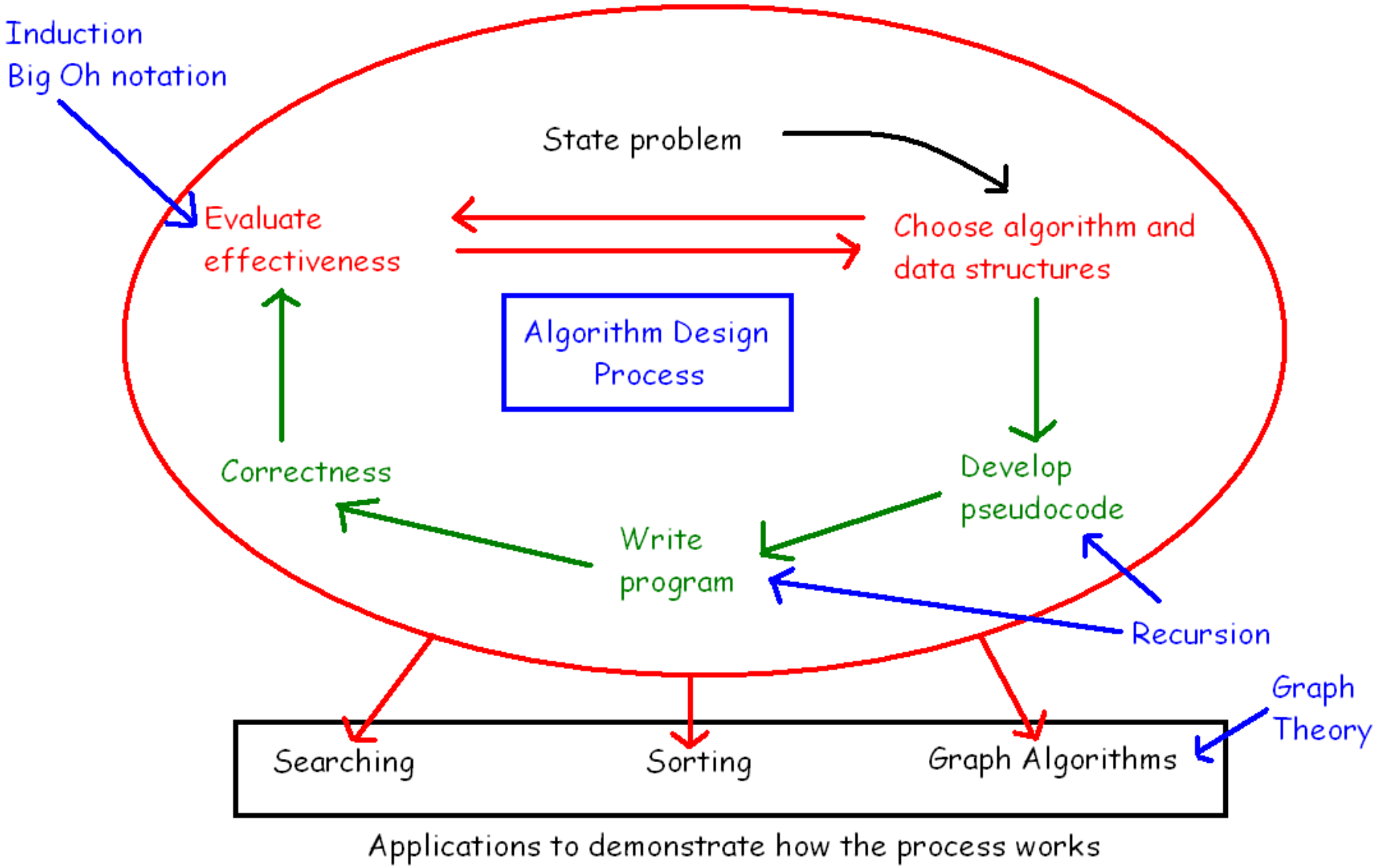
Look for answers that come from "The Book".

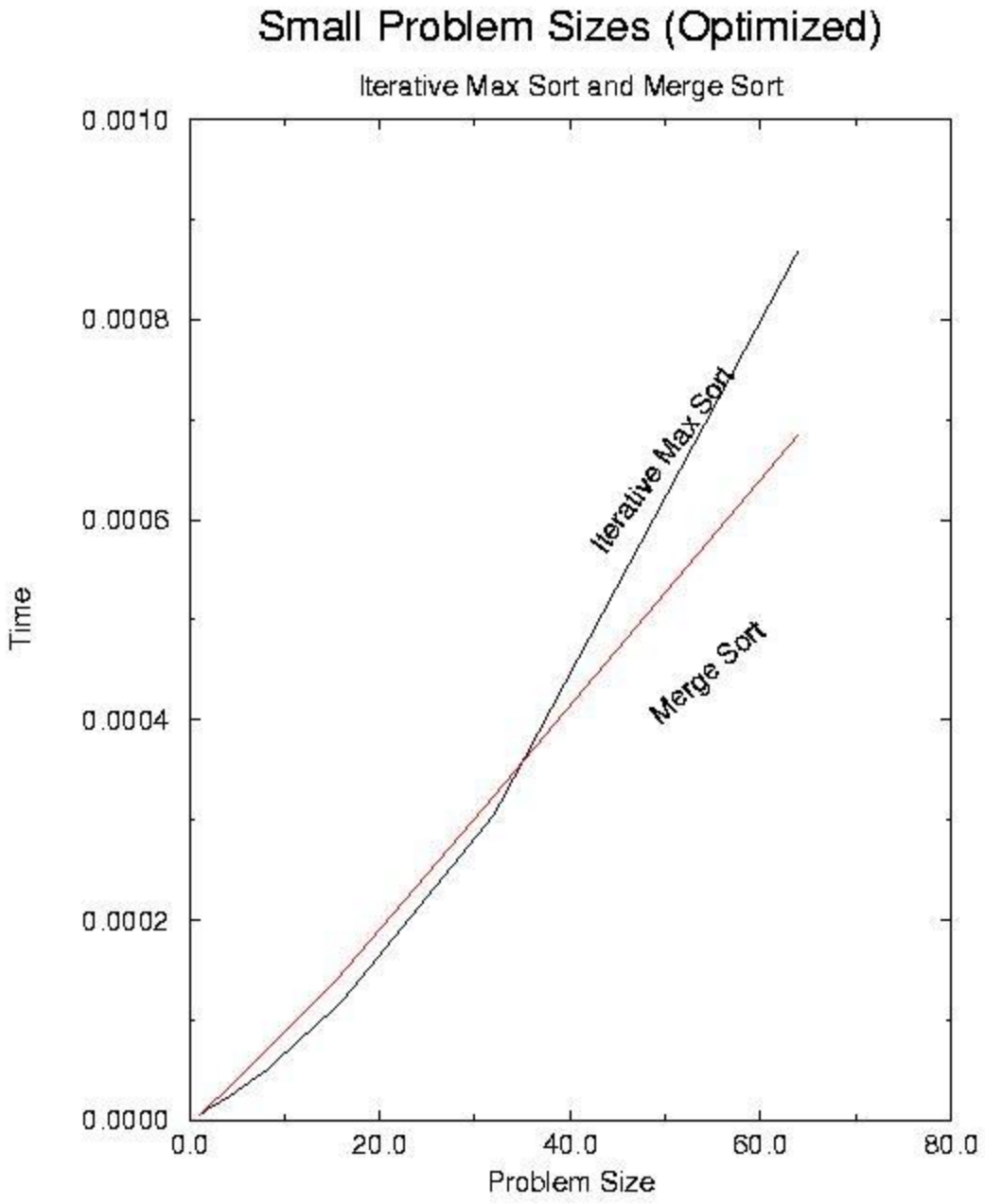
Students with a disability

Please let me know as soon as possible how I can accommodate your disability.

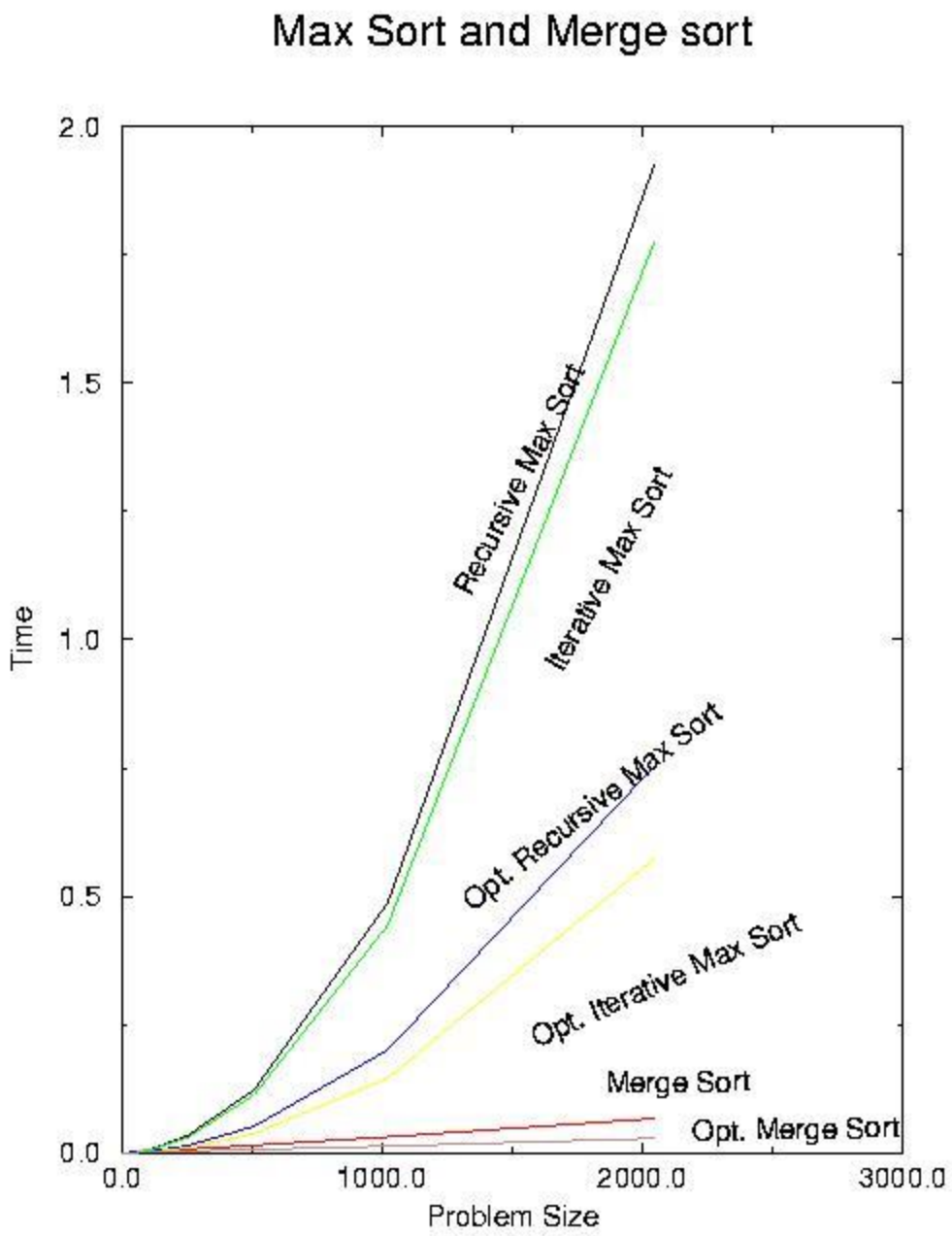
It's sometimes possible to go beyond what is first offered by the disability center.

CSC 225:


Induction
Big Oh notation
State problem
Evaluate effectiveness
Choose algorithm and data structures
Algorithm Design Process
Correctness
Develop pseudocode
Write program
Recursion
Graph Theory
Searching
Sorting
Graph Algorithms
Applications to demonstrate how the process works



Max Sort beats Merge Sort for small problem sizes.



But for bigger problems, Merge Sort is a lot faster.

We will learn paper and pencil techniques for predicting this type of behaviour.

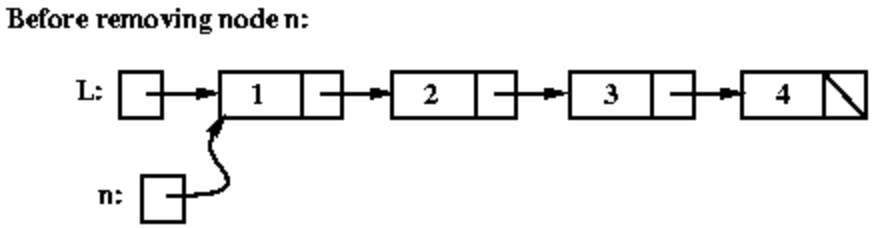
Data Structures revisited:

Stack

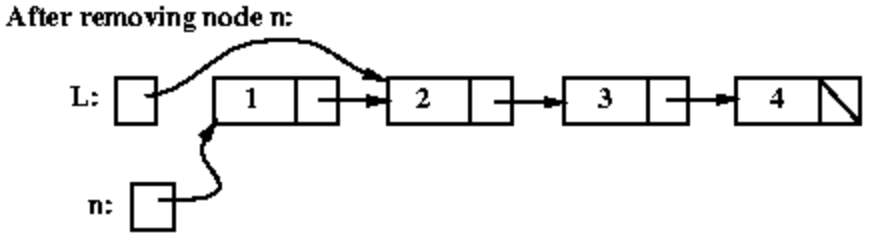
Queue

Images from: http://blog.abhisood.com/?p=69

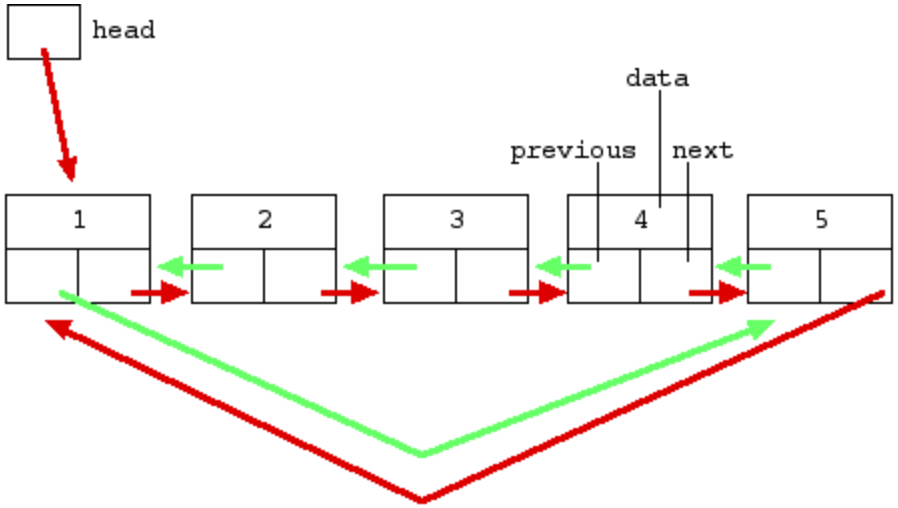
Other data structures:



Linked list



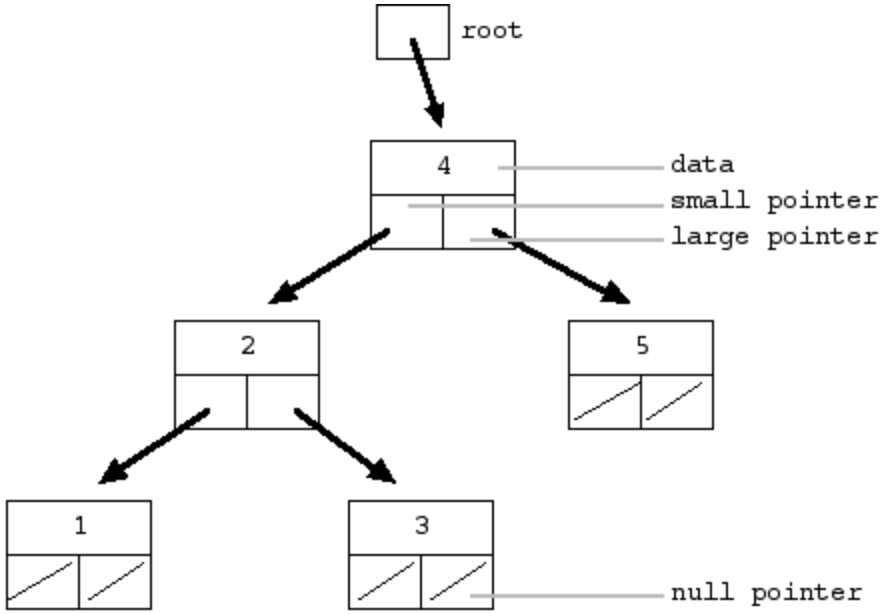
Circular doubly linked list:



http://www.itu.dk/research/algorithms/Kurser/SoegeProjekt/2003MAJ/mirrors/wiscdocs/notes/LINKED-LIST.html

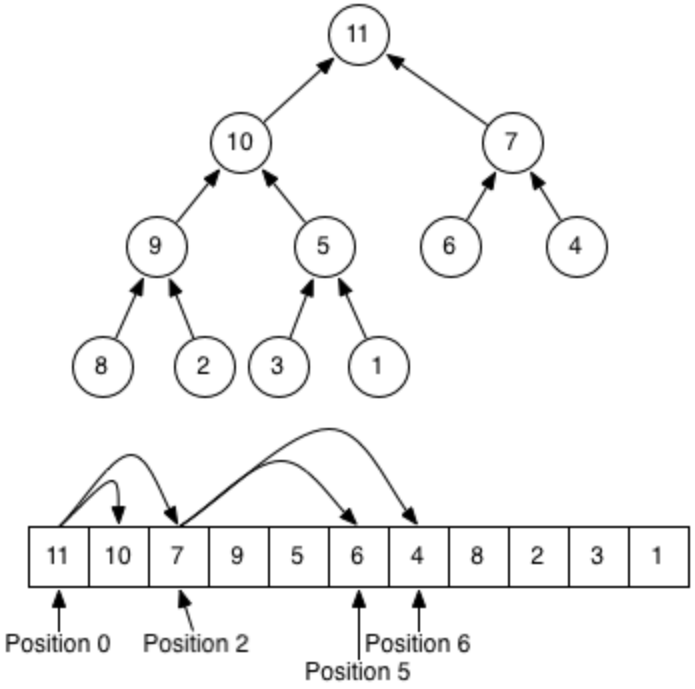
http://cslibrary.stanford.edu/109/TreeListRecursion.html

Ordered binary trees:

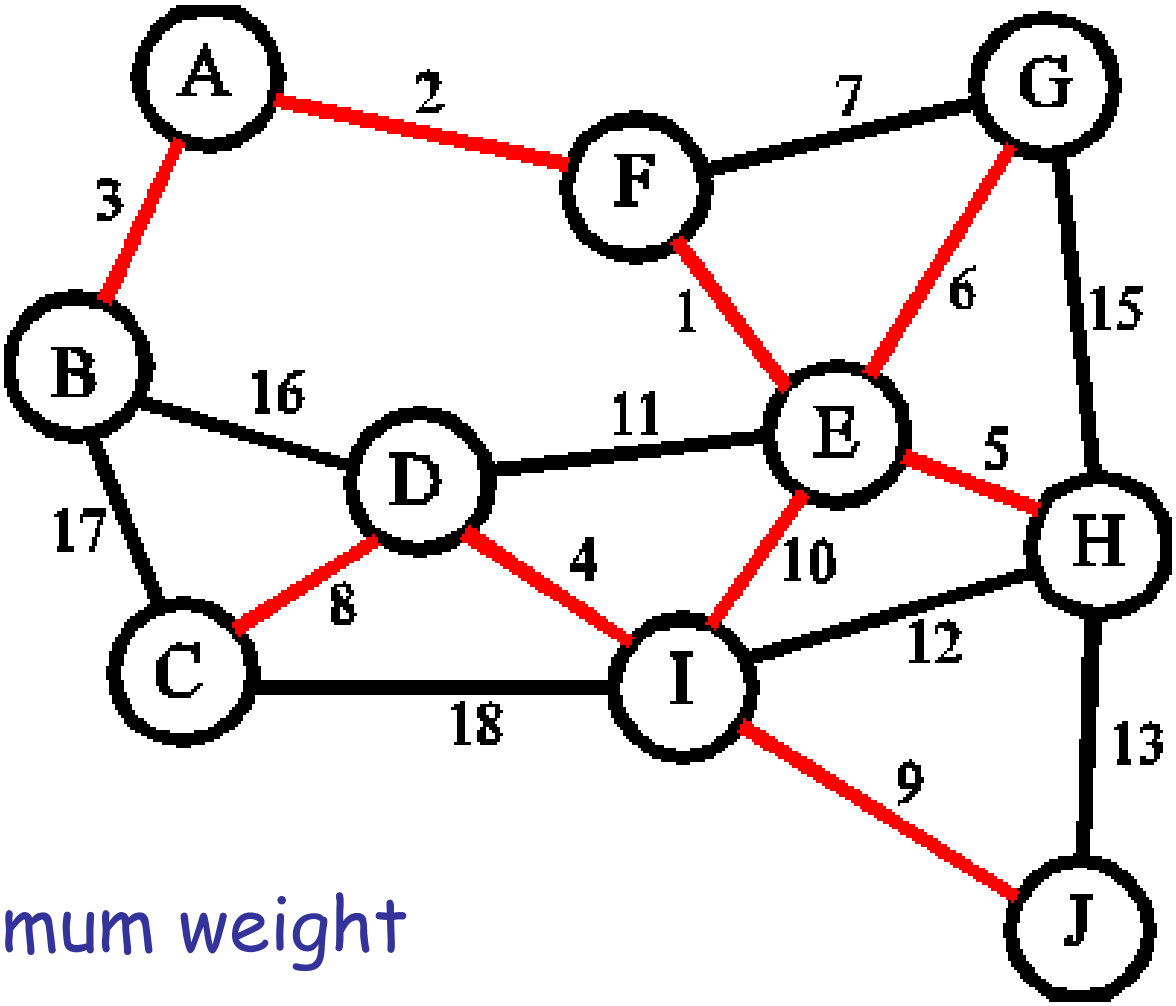


http://cslibrary.stanford.edu/109/TreeListRecursion.html

Heaps:



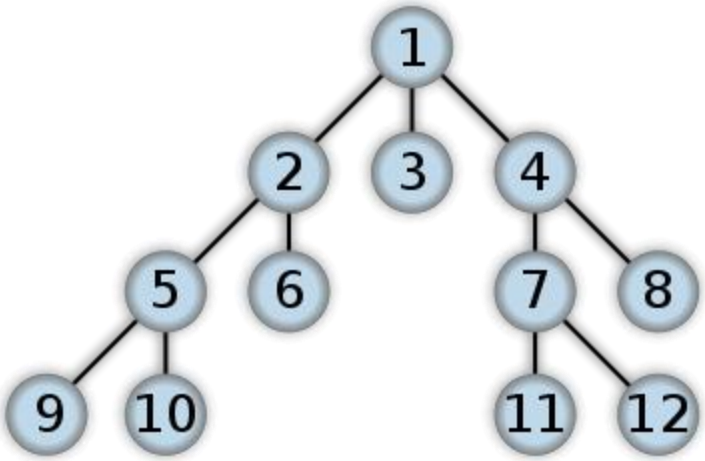
http://scienceblogs.com/goodmath/2008/04/implementing_compact_binary_he.php



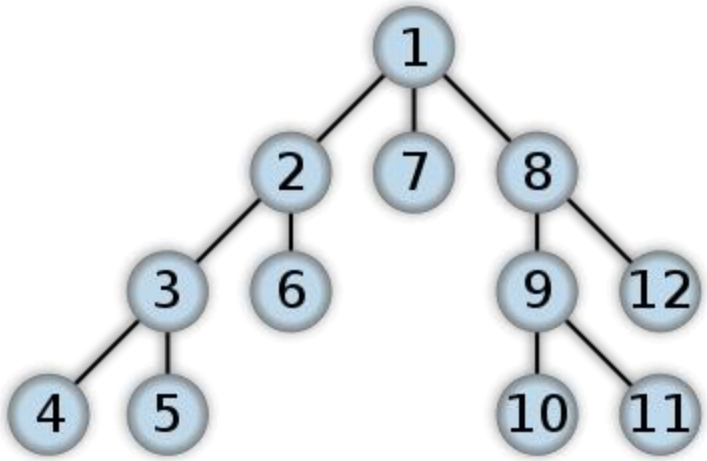
Graphs, and minimum weight spanning trees

http://www.cs.mcgill.ca/~cs251/OldCourses/1997/topic28/

Breadth first search:



Depth first search:



http://www.programmerinterview.com/datastruct/search.php

CSC 225:

The goal is to provide you with the tools to make informed decisions of algorithms and data structures for solving a problem.

What is wrong with my induction proof?

In a drunken haze I decided that the solution to the recurrence $T(1)=1$, $T(n)= 1 + T(n-1)$ is

$1 + 2 + 3 + \ldots + n$.

Theorem: The solution to the recurrence is $n(n+1)/2$.

Proof. [Basis] $T(1)=1$ and $1 *(1+1)/2 = 1$ as required.

[Induction step] Assume that $1 + 2 + \ldots + n-1 + n = n(n+1)/2$.

We want to prove that $1 + 2 + \ldots + n-1 + n + (n+1) = (n+1)(n+2)/2 = (n^2 +3n +2)/2$.

By induction, $1 + 2 + \ldots + n= n(n+1)/2$.

So $1 + 2 + .. + n + (n+1)= n(n+1)/2 + (n+1)$.

Simplifying: $(n^2 + n + 2n + 2)/2= (n^2 +3n +2)/2$ as required.