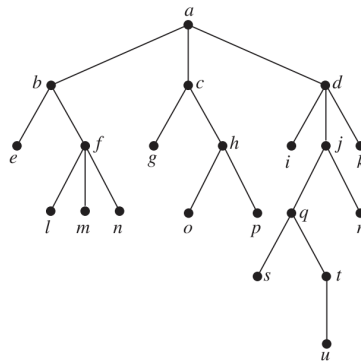


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**Trees, Recurrence Relations, and Partners Worksheet**  
 Recitation 9

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## 1 Discrete Math on Trees



1. Answer these questions about the rooted tree illustrated in the figure above:
  - (a) Which vertex is the root?
  - (b) Which vertices are internal?
  - (c) Which vertices are leaves?
  - (d) Which vertices are children of  $j$ ?
  - (e) Which vertex is the parent of  $h$ ?
  - (f) Which vertices are siblings of  $o$ ?
  - (g) Which vertices are ancestors of  $m$ ?
  - (h) Which vertices are descendants of  $b$ ?
  
2. Is the rooted tree illustrated in the figure above a full  $m$ -ary tree for some positive integer  $m$ ?
  
3. How many edges does a binary tree with 10,000 vertices have?
  
4. How many edges does a full binary tree with 1000 internal vertices have?
  
5. Construct a complete binary tree of height 4 and a complete 3-ary tree of height 3

## 2 Recurrence Relations

1. Find a recurrence relation for each of these sequences:
  - (a) 1, 3, 9, 27, 81, 243 ...
  - (b) 1, 7, 19, 91, 187 ...
2. Find a recurrence relation for the number of strings of digits that contain exactly one 0 or 1 digit.
3. Find a recurrence relation for the number of bit strings of length  $n$  that do not contain three consecutive 0s.
4. Find a recurrence relation for the number of bit strings of length  $n$  that do not contain three consecutive 0s.
5. Find a recurrence relation for the number of bit strings of length  $n$  that contain the string 01

## 3 Choosing Partners for PA4 and PA5

1. Go to the `~cs200/morning` directory and download a copy of the `Baobab.html` file. It can also be viewed at <http://www.cs.colostate.edu/~cs200/Fall14/partners/Baobab.html>
2. Change the name of the file to match your code name which will be available in RamCT. Edit the answers to the questions in the file.
3. Each student needs to designate a category for their file to help with organization:

**Morning**

**Afternoon**

**Evening**

**Weekends**

Pick the time period that best matches when you can/would like to work.

4. Copy the file to the file system directory which matches which category your page should be placed in (morning, afternoon, evening or weekend). You need to do this during recitation. All files must be submitted by 5:00 PM Friday October 24. Failure to submit a file means you will be randomly assigned someone else who failed to submit a page.
5. Once all of the pages have been posted, you will be given a chance to vote for which partner you would like. Monitor your email and RamCT over the weekend for instructions on how to do do.