Assignment 2

CSE 332: Data Abstractions, Spring 2011
University of Washington
April 11, 2011
due: Wednesday, April 20, 2:15 p.m.

Instructions: Create a PDF representation of your answers and submit it via Catalyst CollectIt. You might wish to prepare the file using LaTeX. You may use the source file of this assignment as a starting point if you use LaTeX. The "pdflatex" command installed on most Linux systems is a convenient way to translate the LaTeX source file into a PDF document. Files representing the tree-plus-array diagram used in Problem 3 are also available if you wish to use them. You may prefer to draw the diagrams by hand and scan them to include in your document. The LaTeX source file shows how to include an image, such as a PNG, GIF, or JPG image, in your document. Be sure that your name is clearly visible at or near the top of the first page. The LaTeX source file also shows where you can put that. The due time for this assignment is 2:15 PM, which means that if you turn it in at the last minute (but this is NOT recommended) from somewhere on campus, you'll still have time to get to class.

1. (10 points) Show that x^{63} can be computed with only 8 multiplications.

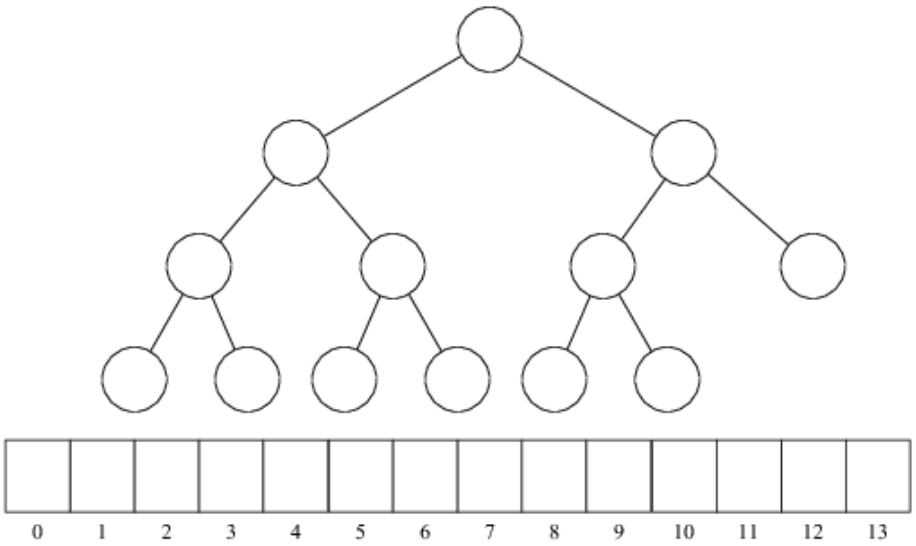
2. (10 points) Do Weiss exercise 2.30. (Word-search running times). In Part a, justify each answer with one or two sentences. In Part b, you may either explain the answer in English or use pseudocode. You don't have to give details on the binary search routine here, but can call it as a given method.

3. (20 points) In this exercise, you'll construct a binary heap and then perform some additional operations on it.

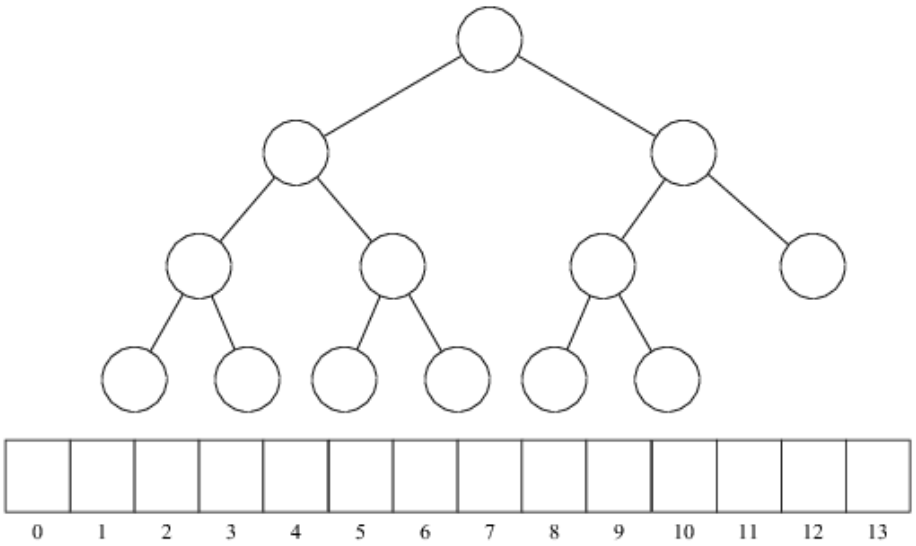
   (a) (10 points) Possibly using the activity sheet as a guide, use BUILD-HEAP to take the following list of 13 elements and create a binary heap with them in the first 14 elements of an array.

   ```
   31 41 59 26 53 58 97 93 23 84 62 64 33
   ```

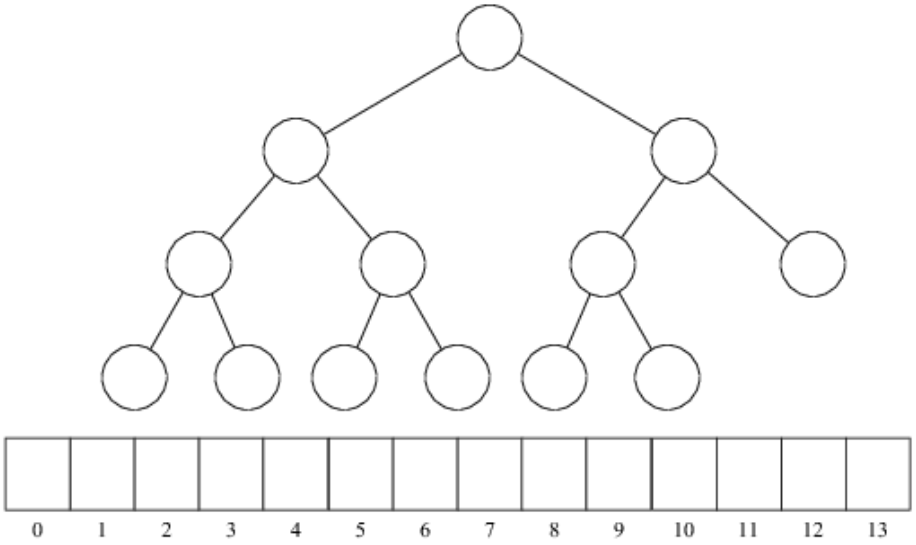
   Show the result both as a binary tree and as a linear array. Fill in your data here.



   (b) (5 points) Perform a DELETE-MIN operation on this tree, showing the resulting binary tree and array. Fill in your data here.



(c) (5 points) Perform an INSERT 27 operation on the latest tree, showing the resulting binary tree and array. Fill in your data here.



4. (20 points) Weiss, problem 6.10a.

5. (10 points) Weiss, problem 4.2d, and problem 4.2e.

6. (15 points) Weiss, problem 4.6. (Use induction and clearly mark your BASIS, INDUCTION HYPOTHESIS, and INDUCTION STEP. Your induction hypothesis should include a statement about the range of values of its variable (e.g., k), and that range should include the value at the basis.

7. (15 points) Weiss, 4.19. Whenever rotations must be performed during the insertion sequence, show the tree right before the insertion of the element that causes the rotation(s). Also show the final tree at the end of the whole sequence.