

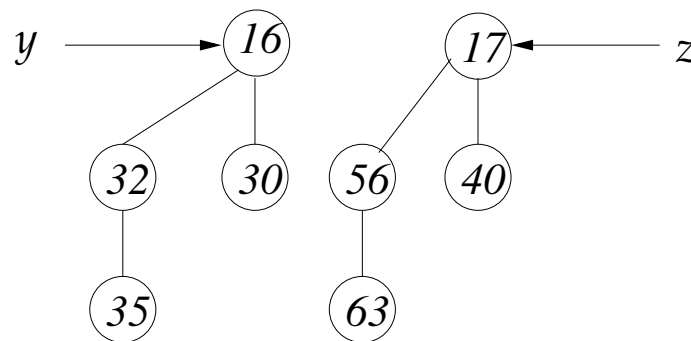
Home Work #5  
DUE: 1pm Sunday Sep 27, 2020  
(upload portrait-mode PDF on Canvas)

✎ Handwritten assignments will not be accepted.

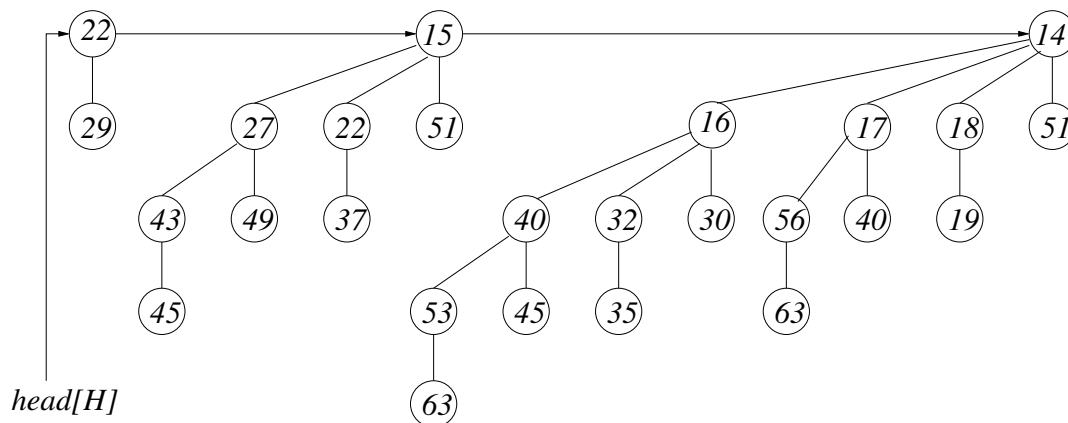
Start your assignment with the following text provided you can honestly agree with it.

- I certify that every answer in this assignment is the result of my own work; that I have neither copied off the Internet nor from any one else's work; and I have not shared my answers or attempts at answers with anyone else.

1. Consider the two  $B_2$  trees shown below. Show the data structures (based on what we had defined in class) corresponding to the trees that  $y$  and  $z$  point to. Now show the resulting data structure after an invocation of  $\text{BINOMIALLINK}(z, y)$ .



2. Using the algorithms discussed in class, show the binomial heap that results when  $\text{BINOMIALHEAPEXTRACTMIN}$  is invoked on the following.



It is enough to show the final heap.

(You may insert a scanned file of your hand-drawn figure. However, it *must* be absolutely clear.)

3. Consider the QUICKSORT we have seen in class.

Suppose the initial invocation is  $\text{QUICKSORT}(A, 1, 9)$ , where

$$A[1..9] = \langle 27, 55, 2, 48, 96, 19, 41, 2, 27 \rangle .$$

- What is the value of  $q$  returned by the very first call to  $\text{PARTITION}$ ?
- What are the subarrays of  $A$  in the two recursive calls to  $\text{QUICKSORT}$  immediately thereafter?
- Draw the entire recursion tree generated from that initial invocation. Follow our notation: each node containing the array segment size inside it and annotated with the non-recursive time outside it.