

2019-05-09 Final Exam Review

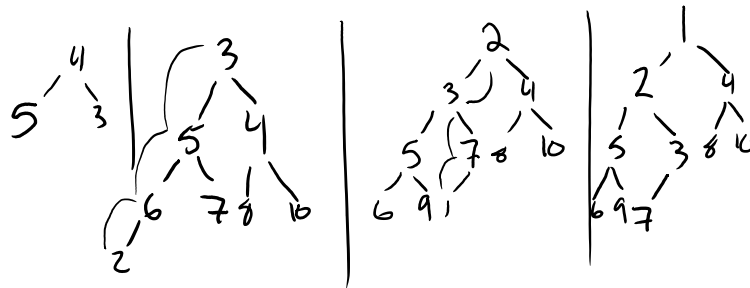
Thursday, May 9, 2019 8:58 AM

Notes

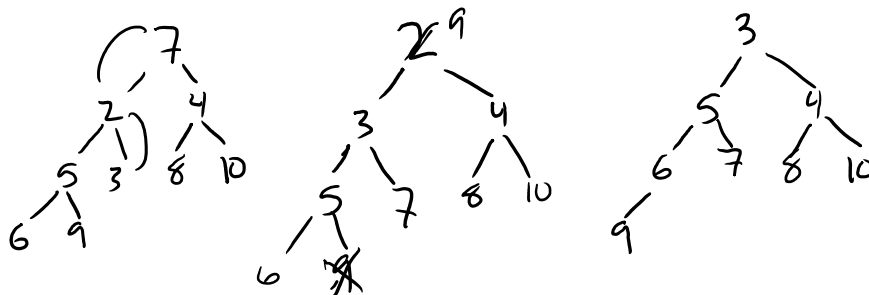
- Exam is 8AM Thursday
- Office hours Wednesday, 10-12, 1-5 (pending not getting selected for jury duty)
- Available via email rest of time
- Exam is cumulative

4. **Binary Heaps** Starting with an empty binary **min heap**, show the following.

A. [3] The final state of the heap, in tree form, after adding in the values: 5, 4, 3, 6, 7, 8, 10, 2, 9, 1



B. [2] The state of the heap, in tree form, after two Dequeue() operations



C. [1] The final, array-based version of the heap

3	5	4	6	7	8	10	9		
0	1	2	3	4	5	6	7	8	9



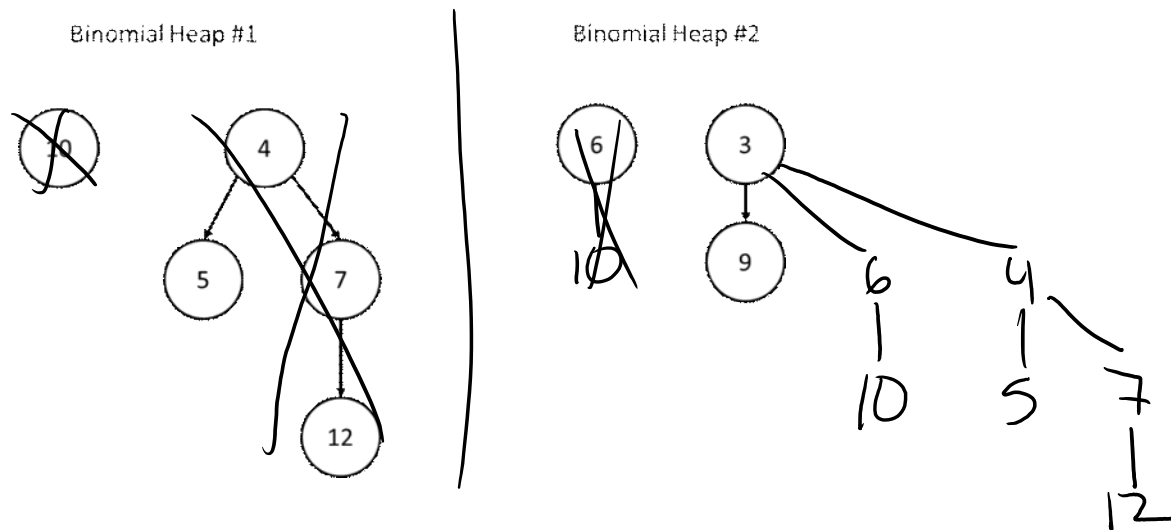
5. [3] Merge the following two **binomial heaps**

Binomial Heap #1

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Binomial Heap #2

5. [3] Merge the following two binomial heaps



7. [3] The item "B" hashes to array index 3. Insert B into the following hopscotch hashtable whose max distance is 4.

A	C	E	G	D	H	I			
1100	0100	0010	1000	0000	1100	0000			
0	1	2	3	4	5	6	7	8	9

RESULT:

A	C	E	G	D	H	B	I		
1100	0100	0010	1000	0000	1010	0000	0000		
0	1	2	3	4	5	6	7	8	9

20. [2] Given the quadratic probe(i) = ($i^2 + 1$) % 10, insert the value H, which hashes to array location 1.

A	B	C	D	E	F	H			
0	1	2	3	4	5	6	7	8	9

19. [2] Cuckoo Hashtables. Given the following hash results, add the value "A" into the first array of the cuckoo hash below:

Hashing results:

A: 2,5 B: 1,5 C: 2,7 D: 9,3 E: 1,2 F: 7,2 G: 3,5 I: 3,3 J: 0,5 K: 2,3

Array 1:

J	B	A X	I						D
0	1	2	3	4	5	6	7	8	9

Array 2:

		E	K X		G		C		
0	1	2	3	4	5	6	7	8	9

YOUR ANSWER: After inserting 'A'

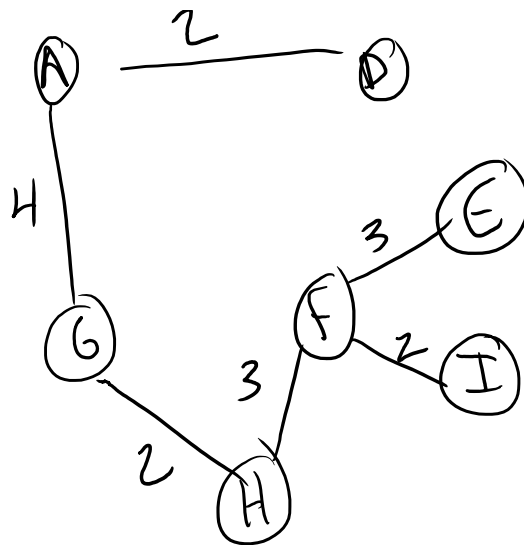
Array 1:

0	1	2	3	4	5	6	7	8	9

Array 2:

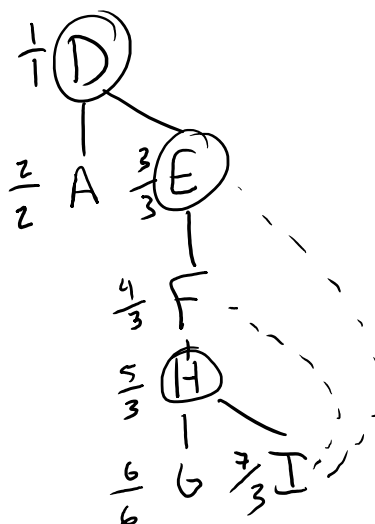
0	1	2	3	4	5	6	7	8	9

Construct an MST for the following graph:

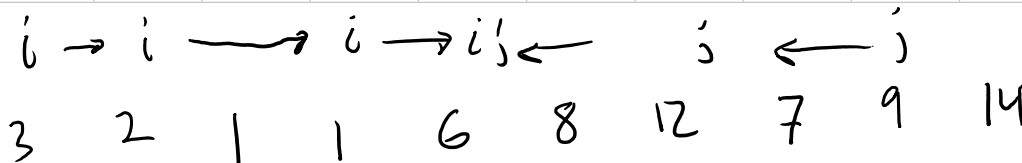


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graph LR
    A ---|2| D
    D ---|5| E
    E ---|3| F
    E ---|4| I
    F ---|2| I
    F ---|3| H
    G ---|2| H
    H ---|5| I
  
```



3	9	1	12	14	8	1	7	2	6
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3	9	1	12	14	8	1	7	2	6
---	---	---	----	----	---	---	---	---	---

1		
1	1, 1	
2	12, 2	
3	3	
4	14	
5		
6	6	
7	7	
8	8	
9	9	

3	9	1	12	14	8	1	7	2	6
1	1	12	2	3	14	6	7	8	9

What is this sorting algorithm after 1 iteration?

3	9	1	12	14	8	1	7	2	6
3	9	1	12	14	8	1	7	2	6