EC 330 HW 5
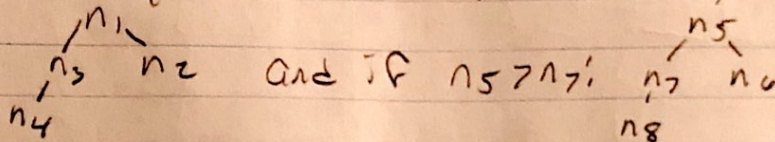
1) To construct a max heap from eight #s $\{n_1, n_2 \ldots n_8\}$ by only using 8 comparisons,

- we begin with a set of 4 pairs where:
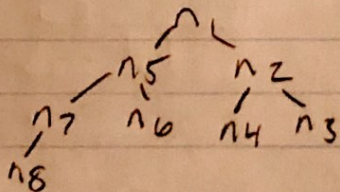 $$n_1 > n_2, \quad n_3 > n_4, \quad n_5 > n_6, \quad n_7 > n_8$$

- Then, we compare the largest elements of two pairs, where if $n_1 > n_3$, our tree is

  n_1
  n_3 n_2
  n_4

  and if $n_5 > n_7$:

  n_5
  n_7 n_6
  n_8

- we then need to know which of the two max-heaps has the larger root. if $n_1 > n_5$, we use our eighth + final comparison to rearrange the elements that are children of n_1. This is essential b/c otherwise the final merged heap would not necessarily follow max-heap properties.

- By checking the two children of the larger root (n_1), if $n_2 > n_3$ our final max-heap ordered w/ 8 comparisons is

  n_1
  n_5 n_2
  n_7 n_6 n_4 n_3
  n_8

2) For the seq 17, 423, 64, 79, 411, 89, 99, 15

a) chaining

collision
$\dfrac{99 \bmod 13}{}$

0	→ [79]
1	→ [15]
2	
3	
4	[17] → [17]
5	
6	
7	423
8	99
9	
10	
11	→ [89]
12	→ [64]
13	

[411]

[99]

b) linear probing

collision
$(99+1) \bmod 13$

0	
1	79
2	15
3	
4	17
5	
6	
7	423
8	411
9	99
10	
11	89
12	64

c) quadratic probing

collision
$(99+1^2+1) \bmod 13$

0	
1	79
2	15
3	
4	17
5	
6	
7	423
8	411
9	
10	99
11	89
12	64

d) using a second hash

0	99
1	79
2	
3	
4	17
5	
6	
7	423
8	411
9	
10	
11	89
12	64

collision
$99 \bmod 13$
$7 - 99 \bmod 7 = 6$