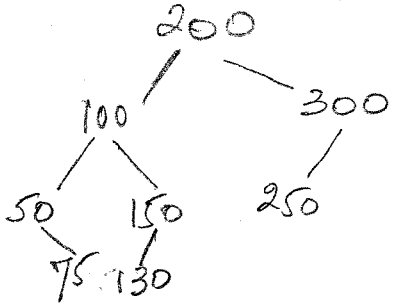
CS 315 Homework Exercise 4 Answers

Qu 1

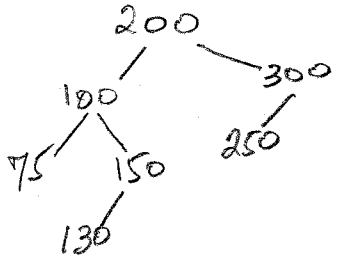
(a)



(2 pts)

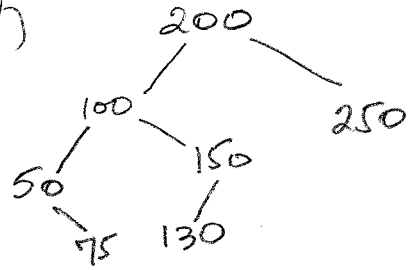
(b) 200, 100, 50, 75, 150, 130, 300, 250 (2 pts)

(c)



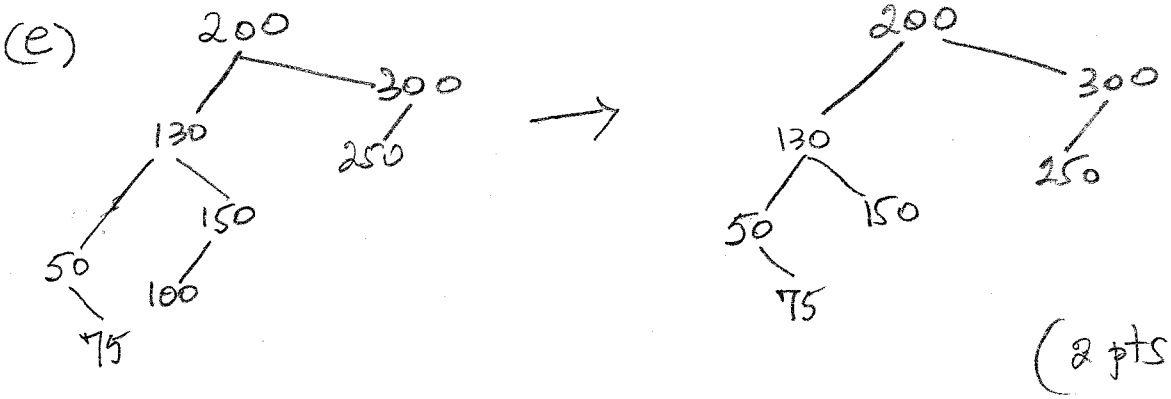
(2 pts)

(d)



(2 pts)

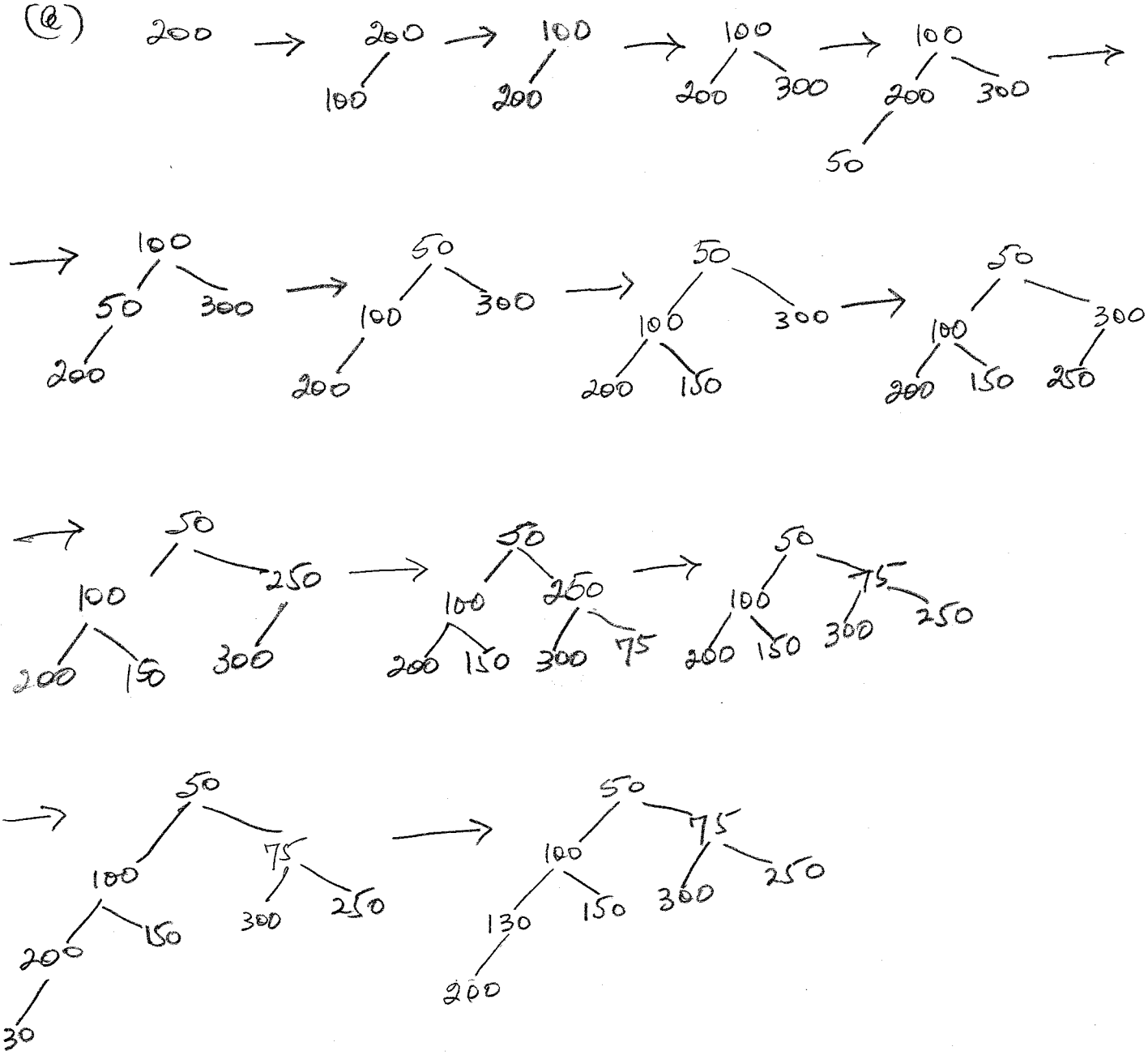
(e)



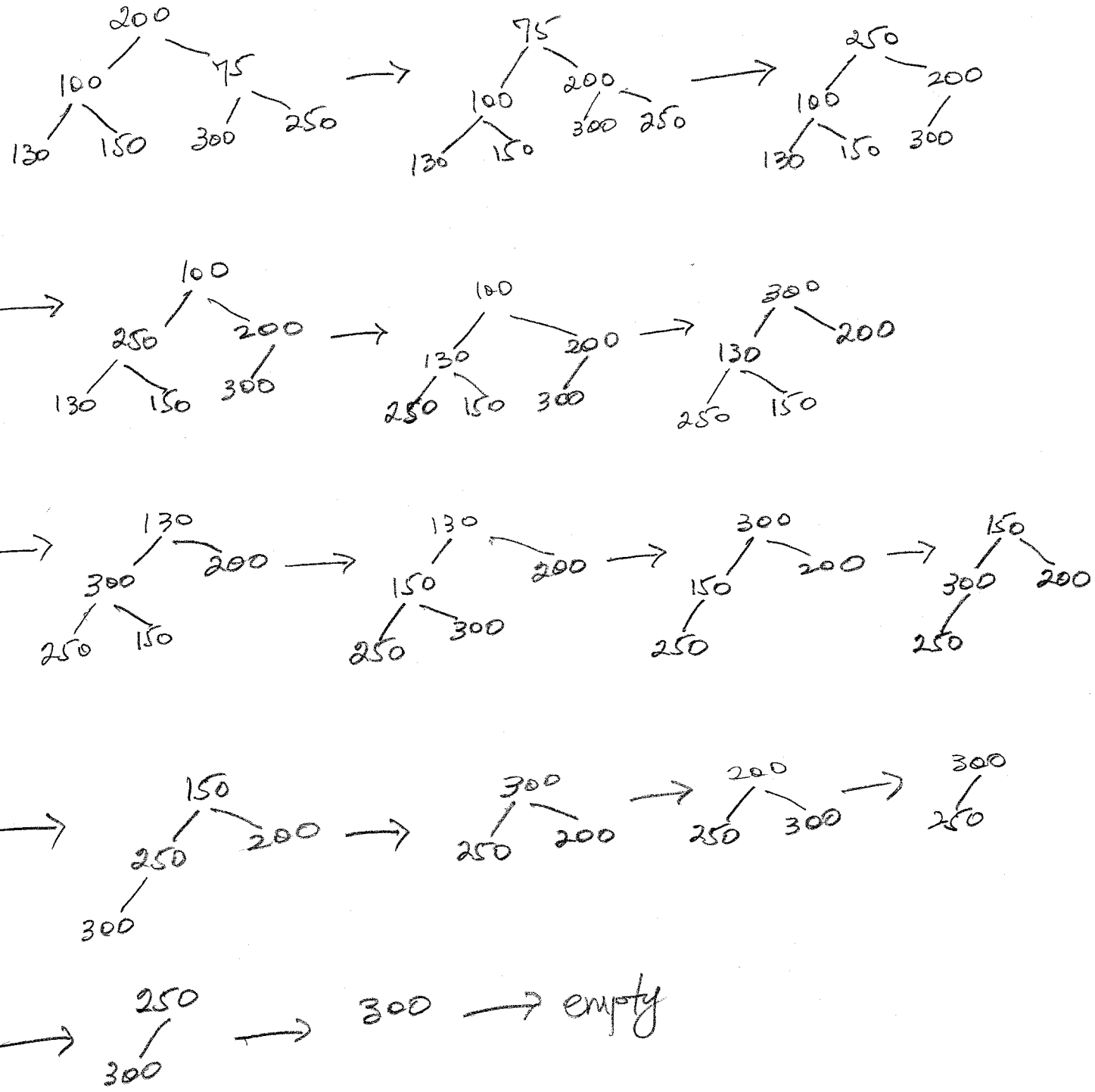
(2 pts)

2. 200, 100, 300, 50, 150, 250, 75, 130 (5 pts)

(a)



2(b) 50, 75, 100, 130, 150, 200, 250, 300 (5 pts)



(3)

0	1	2	3	4	5	6	7	8
100	72	88	58	65	44	30	23	

(a) 88 is at $i = 2$ children at $2(2)+1 = 5$ and $2(2)+2 = 6$

So 44, 30

(b) 30 is at index 6 so parent at $(6-1)/2 = 5/2 = 2$

So, 88

(c)

0	1	2	3	4	5	6	7	8
100	72	88	58	65	44	30	23	150

INDEX 8 → (8-1)/2 → 7/2 → 3 (parent)

58 < 150 So swap

0	1	2	3	4	5	6	7	8
100	72	88	150	65	44	30	23	58

INDEX 3 → (3-1)/2 → 2/2 → 1 (parent)

72 < 150 so swap

0	1	2	3	4	5	6	7	8
100	150	88	72	65	44	30	23	58

INDEX 1 → (1-1)/2 → 0/2 → 0 (parent)

100 < 150 so swap

0	1	2	3	4	5	6	7	8
150	100	88	72	65	44	30	23	58

(4) (a) n elements and go down the tree $O(n \log n)$

(b) n elements and you may have to go down the tree each time in the worst case so $O(n \log n)$.

(c) $O(\log n)$ Worst case: go all the way down

(d) $O(n)$ breadth-first

(e) $O(\log n)$ go down tree to last level

(f) $O(\log n)$ Swap and then you may have to go all the way to the bottom.