

CSE 202 Midterm 2 Part (b)

Olcay Taner YILDIZ

I. MULTIPLE CHOICE QUESTIONS (40 POINTS)

1. Given the following data $a = (4-3-8-9-2)$ as a queue. What will be the queue after the following operations?

- a.enqueue(4)
 a.enqueue(9)
 a.dequeue()
 a.enqueue(3)
 a.dequeue()
 a) 8-9-2-4-9-3
 b) 4-9-3-4-3-8
 c) 9-4-3-8-9-2
 d) 4-3-8-9-2-4
 e) 3-9-4-4-3-8

2. What will be the time complexity of enqueue and dequeue if we implement it with doubly linked list?

- a) $\mathcal{O}(1)$, $\mathcal{O}(N)$
 b) $\mathcal{O}(N)$, $\mathcal{O}(1)$
 c) $\mathcal{O}(1)$, $\mathcal{O}(1)$
 d) $\mathcal{O}(\log N)$, $\mathcal{O}(1)$
 e) $\mathcal{O}(\log N)$, $\mathcal{O}(\log N)$

3. If the size of the queue is N (array implementation), how many elements can we store in that queue?

- a) N
 b) $N - 1$
 c) $N + 1$
 d) $N - 2$
 e) $N + 2$

4. In the game of Darts, if we have 3 different circles to shot to (5, 10, 15), which states will be traversed to search for two shots?

- a) 0, 5, 10, 15
 b) 0, 5, 10, 15, 20, 30
 c) 5, 10, 15, 20, 30
 d) 0, 5, 10, 15, 20, 25, 30
 e) 5, 10, 15

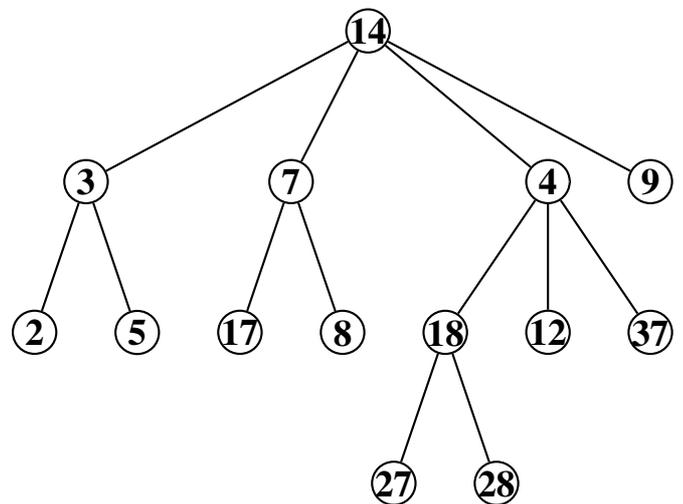
5. For array implementation, which of the following code fragments check for empty queue and full

queue?

- a) `return first == last;`
`return first == (last + 1);`
 b) `return first == last + 1;`
`return first == last;`
 c) `return first == (last + 1) % N;`
`return first == last;`
 d) `return first == last;`
`return first == (last - 1) % N;`
 e) `return first == last;`
`return first == (last + 1) % N;`

6. For linked list implementation, what are the linked list operations to implement a FILO (first in, last out) queue?

- a) enqueue: insertFirst, dequeue: removeLast
 b) enqueue: removeLast, dequeue: insertFirst
 c) enqueue: insertLast, dequeue: removeFirst
 d) enqueue: removeFirst, dequeue: insertLast
 e) enqueue: insertFirst, dequeue: removeFirst



7. Given the tree above, what is (i) the root of the tree, (ii) degree of node 4, (iii) depth of the tree?

- a) 7, 3, 3
 b) 14, 6, 4
 c) 9, 4, 3
 d) 14, 3, 3

e) 14, 3, 4

8. What are the minimum and maximum number of nodes in a binary tree of depth 4?

- a) 4, 12
- b) 5, 31
- c) 3, 7
- d) 4, 15
- e) 6, 10

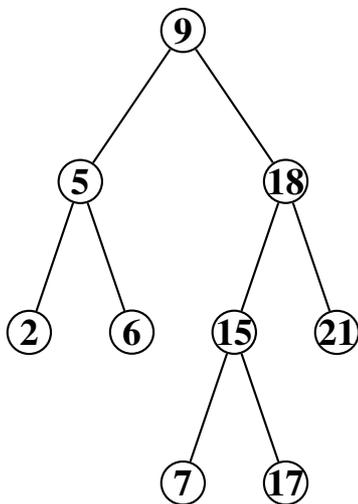
9. If we want to obtain a balanced binary search tree from numbers 1 to 7, what is the correct order of insertion of those numbers to the binary search tree?

- a) 4, 5, 6, 2, 1, 3, 7
- b) 1, 2, 3, 4, 5, 6, 7
- c) 4, 2, 6, 1, 3, 5, 7
- d) 3, 5, 7, 2, 6, 4, 1
- e) 4, 2, 1, 3, 5, 6, 7

10. What is the best, worst time complexity for search in a binary search tree?

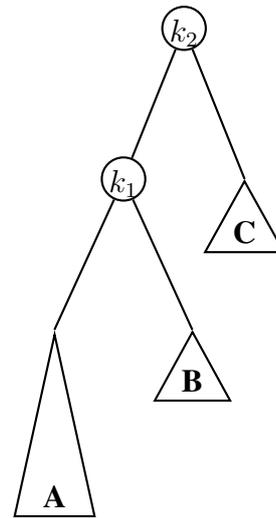
- a) $\mathcal{O}(1)$, $\mathcal{O}(\log N)$
- b) $\mathcal{O}(1)$, $\mathcal{O}(N)$
- c) $\mathcal{O}(1)$, $\mathcal{O}(1)$
- d) $\mathcal{O}(\log N)$, $\mathcal{O}(\log N)$
- e) $\mathcal{O}(\log N)$, $\mathcal{O}(N)$

11. Given the tree below, which node does not



satisfy the binary search tree property?

- a) 18
- b) 6
- c) 7
- d) 21
- e) 17



12. Given the situation below, what is the correct code to implement single rotation?

- a) `k1 = k2.left;`
`k1.right = k2;`
`k2.left = k1.right;`
- b) `k1 = k2.left;`
`k2.left = k1.right;`
`k1.right = k2;`
- c) `k1 = k2.left;`
`k2.left = k1.right;`
- d) `k1 = k2.left;`
`k1.right = k2;`
- e) `k2.left = k2.left.right;`
`k2.left.right = k2;`

13. Given the tree in Question 11, which of the following shows the postorder traversal of the tree?

- a) 2, 6, 5, 7, 17, 15, 21, 18, 9
- b) 2, 5, 6, 9, 7, 15, 17, 18, 21
- c) 9, 5, 2, 6, 18, 15, 7, 17, 21
- d) 9, 5, 18, 2, 6, 15, 21, 7, 17
- e) 2, 6, 7, 17, 21, 5, 15, 18, 9

14. What is the maximum number of values that can be stored in a B+ tree of depth 3 width $d = 1$?

- a) 20
- b) 26
- c) 24
- d) 18
- e) 22

15. Which of the following numbers may not be used as a hash table size?

- a) 101
- b) 13

- c) 29
- d) 37
- e) 64

16. Given an hash table of size 7, which of the following shows the resulting hash table after inserting 18, 23, 66, 34?

- a) [-, -, 23, 66, 18, -, 34]
- b) [18, 23, 66, 34, -, -, -]
- c) [-, 18, -, 34, -, 23, 66]
- d) [-, 18, -, -, 23, 66, 34]
- e) [-, 23, 66, 18, -, 34, -]

17. Which of the following methods is not a possible collision resolution strategy?

- a) Separate Chaining
- b) Linear Probing
- c) Quadratic Probing
- d) Double Hashing
- e) Hash Function

18. What is the best, worst time complexity for search in hash table?

- a) $\mathcal{O}(1)$, $\mathcal{O}(\log N)$
- b) $\mathcal{O}(1)$, $\mathcal{O}(N)$
- c) $\mathcal{O}(1)$, $\mathcal{O}(1)$
- d) $\mathcal{O}(\log N)$, $\mathcal{O}(\log N)$
- e) $\mathcal{O}(\log N)$, $\mathcal{O}(N)$

19. Given an hash table of size 53, what is the suggested size of the hash table after rehashing?

- a) 67
- b) 106
- c) 107
- d) 221
- e) 89

20. Which of the following index(es) are better for interval queries ($x > 10$ AND $x < 70$)?

- a) Hash Index
- b) None
- c) Hash Index, Tree Index
- d) Tree Index
- e) Has Index, sometimes Tree Index