CSCE146 – Practice Final Exam

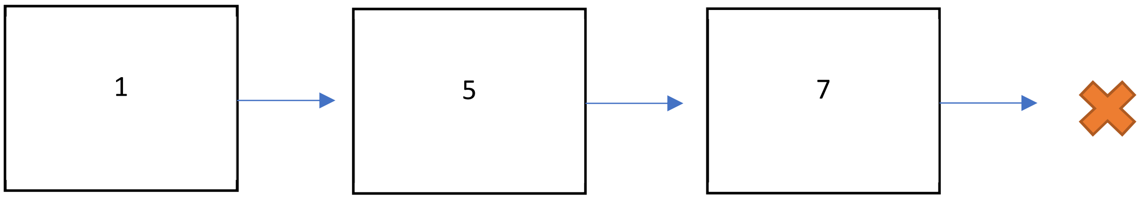
CSCE146 F2017 SI | Final Exam | JJ Shepphard’s class

Linked Lists

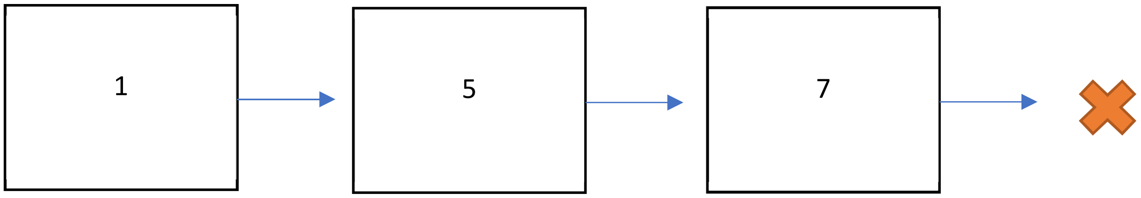
Know how to write code to find, delete, and insert Nodes

1. List a few Advantages and Disadvantages of using a Linked List over an Array.

2. Draw the Insertion Procedure for adding a node after the node containing 5



3. Draw the Removal Procedure for the node after 5.



Queues

Know how to write code to Enqueue, Dequeue and Peek in a Queue

4. Draw the Queue after each Operation

Head						
5	4	8				

Enqueue 3

Head						

Dequeue 3 times

Head						

Enqueue 6 and 24

Head						

Dequeue 2 times

Head						

5. What will the code snippet print out?

```
Queue<Integer> q = new
LinkedQueue<Integer>();
//Assume that this Queue uses
enqueue(), dequeue(), and peek()

for (int i = 5; i >= -5; i--) {
  q.enqueue(i);
}
for (int i = 3; i < 6; i++) {

System.out.println(q.dequeue());
}
for (int i : q) {
  System.out.println(q);
}
```

Stacks

Know how to code Push, Pop, and Peek

6. What will the Code Snippet Print out?

```
Stack<Integer> s = new
LinkedStack<Integer>();
//Assume that this Stack uses
pop(), push(), and peek()
```

```
for (int i = 5; i >= -5; i--) {
  s.enqueue(i);
}
for (int i = 3; i < 6; i++) {

System.out.println(s.dequeue());
}
for (int i : s) {
  System.out.println(s);
}
```

7. Draw the Stack after each Operation.

Head						
5	4	8				

Push 3

Head						

Pop 3 times

Head						

Push 6 and 24

Head						

Pop 2 times

Head						

Recursion

8. What data Structure can be used to illustrate Recursion?

9. What does this code do?

```
public static int f(int a) {
  if (a <= 1) return 1;
  return f(a - 1) + a;
}
```

Searching and Sorting

Array: {45,23,12,79,36,42,10}

10. Perform Mergesort on the Given Array

11. Perform a Binary Search for 45 for the given array (After it has been sorted)

Asymptotics

12. Sort the Big O times in Bounding order.

$O(n)$ $O(n^2)$ $O(n^2 lg(n))$ $O(n^3)$ $O(1)$ $O(n!)$ $O(n^n)$ $O(lg(n))$ $O(2^n)$

13. List the Big O times (Worst-case) of the following algorithms

Binary search, Merge Sort, Quick Sort, Insertion Sort, Bubble Sort, Selection Sort, Binary Search Tree Insertion, Tower of Hanoi, Travelling Sales Person

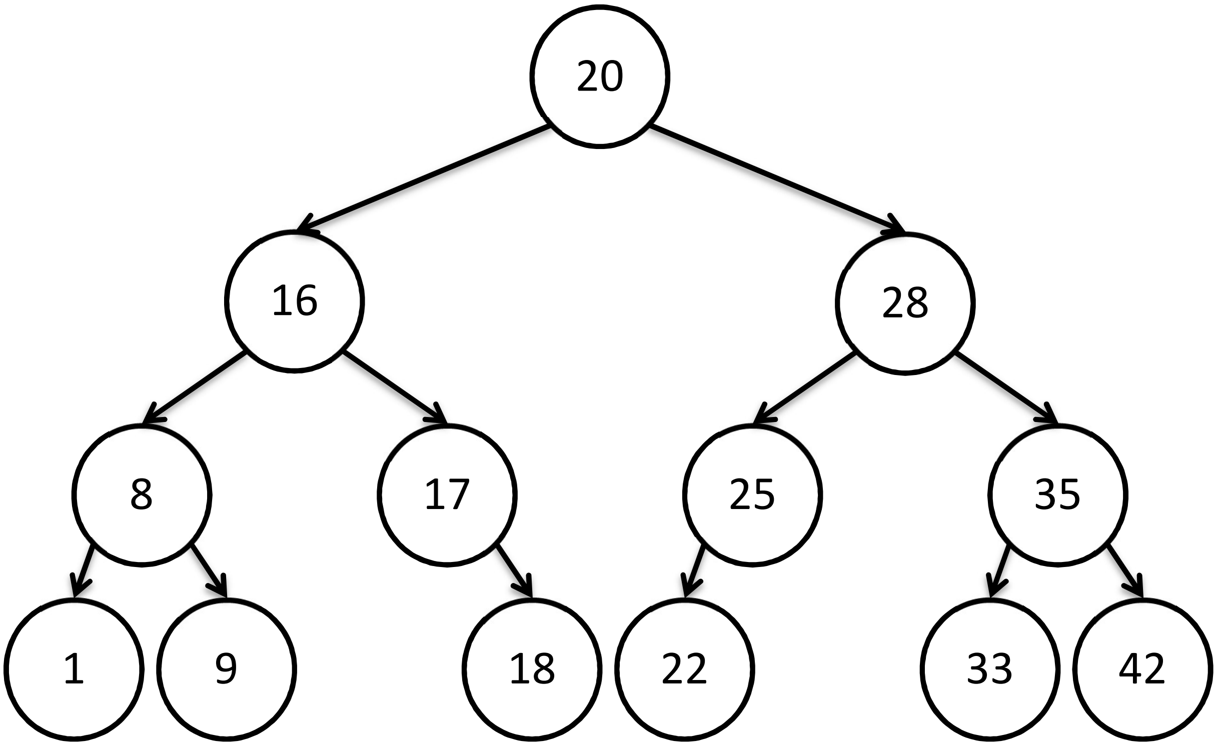
Java Code

14. Write a Method for Binary Search

```
public static Boolean binarySearch(int[] a, int value
```

Binary Search Trees

15. Remove 28 from this BST. Show end result.



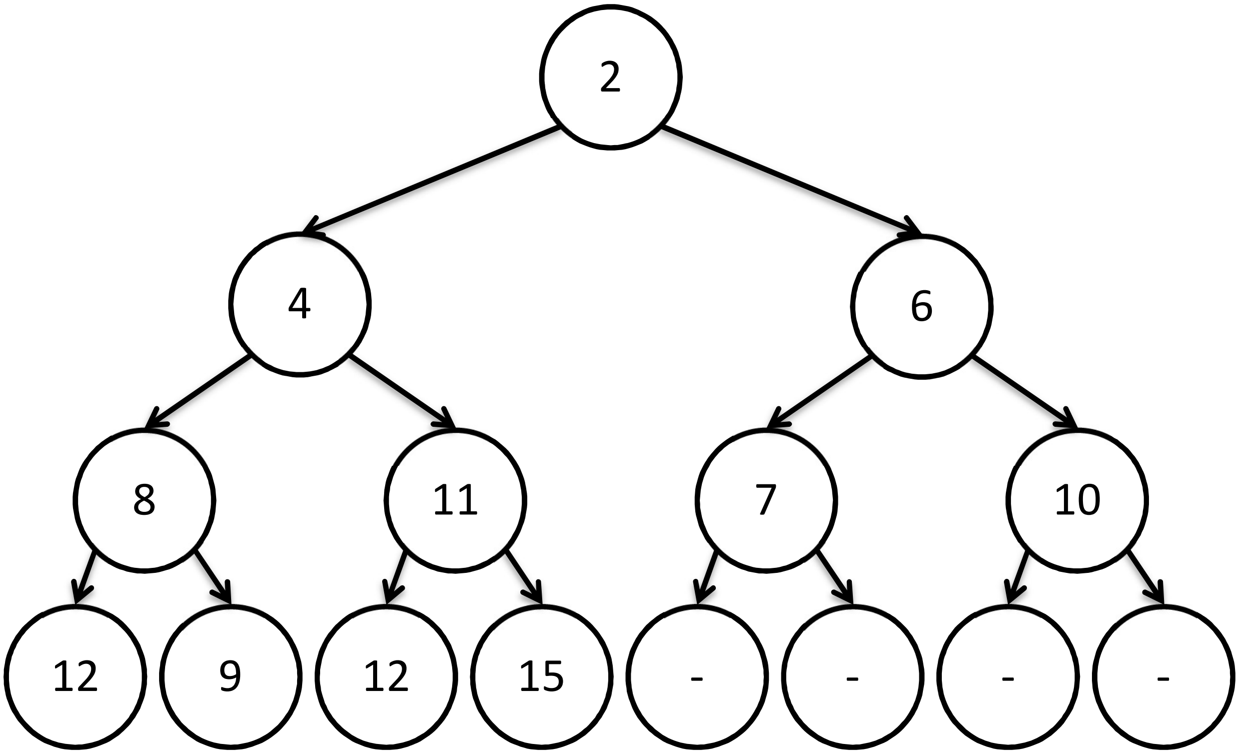
16. Show Pre-order, In-order, post-order and breadth-order traversals of this tree

Heaps

17. Write insert method for a heap

```
public void insert(int a) {
```

18. Remove from the Min Heap and show end result.



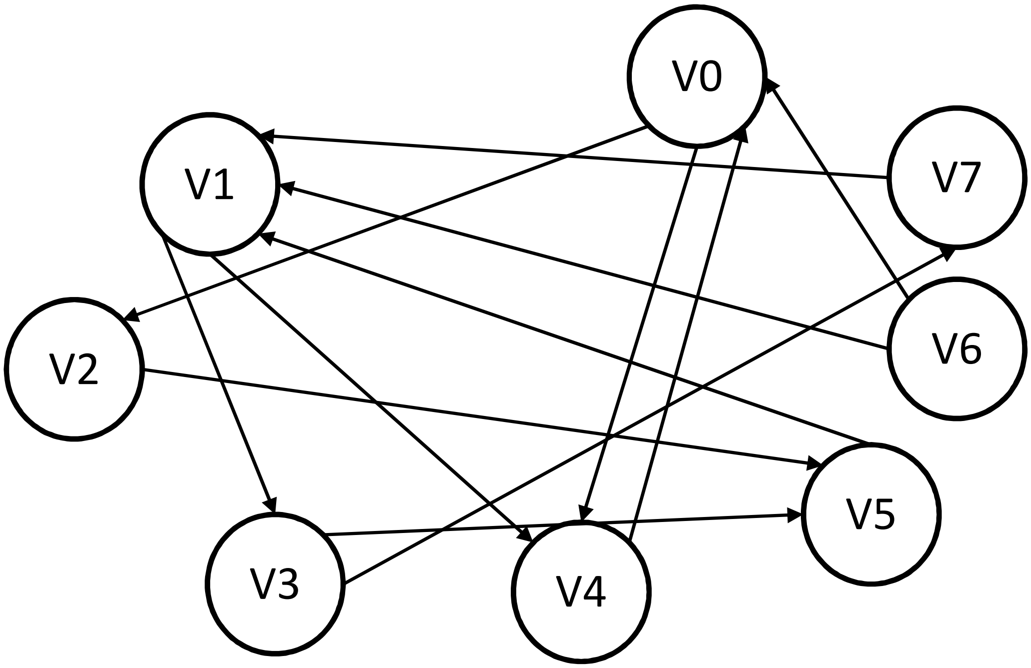
19. Using the array implementation of a min heap, show the array after inserting 7

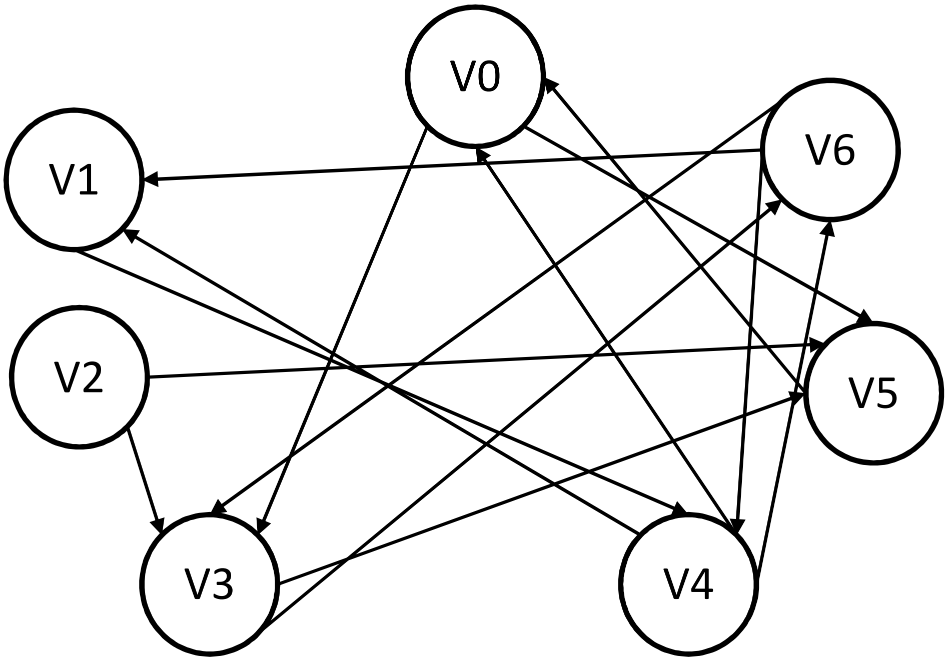
Index	0	1	2	3	4	5	6
Value	4	5	11	8	6	16	20

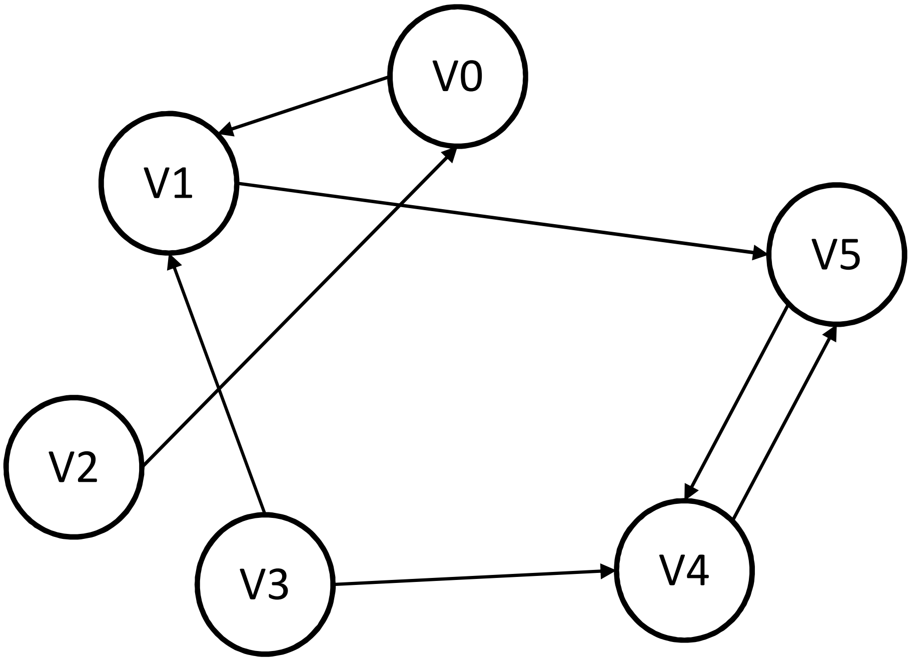
Index	0	1	2	3	4	5	6
Value							

Graphs

20. Talk about if Graphs are trees
21. For the Following Graphs:
    - Show an Adjacency Matrix (Row is From, Column is To)
    - Show the DFS and BFS Traversals







Hash Tables

22. Put the following Tuples in a Hash Table, where the first value is the key and the second is the value.

{(1,”a”), (2,”b”), (2,”g”), (4,”z)}