

## Data Structures Final Exam – Iyad Jaber

- Q1: Time Complexity: two questions
- Q2: Given a linked list, and two numbers x & y, from the start of the linked list to the end, skip x nodes and then delete y number of nodes and then skip x number of nodes and then delete y nodes repeatedly until the end of the linked list, your method will be something like `skipAndDelete(Node head, int x, int y)`, for example:  
skipAndDelete(head, 2,3) for this linkedlist {1,3,5,2,5,11,9,6,7,4,-1,3,4}  
would make the list as following: {1,3,11,9,-1,3}.  
You have to write the code/algorithm.
- Q3: Given a queue filled with data, and a number n, you have to flip the first n nodes. For example: if the queue is like this: [A|B|C|D|E|F|G|H], where H is at the end of the queue (first pushed) and A is the front at the queue (last pushed), given a number n=3, the result queue should be like this: [C|B|A|D|E|F|G|H], first 3 elements where reversed/flipped. Write your code.
- Q4: Given a max heap array, write the code that converts it to a min heap.
- Q5: Trace the following AVL tree, insert #,#,#, delete #, ... and so..
- Q6: Trace the following Hash Set, given a table with three columns, one for linear probing, one for quadratic and one for double hashing. insert #,#,#,#,#... and so..
- Q7: Trace the following Min Heap, insert #,#,#, delete #, ... and so..
- Q8: For each of the following sorting algorithms, write the time complexity of the algorithms in the given case.  
Ex: Bubble Sort for random data?  $n^2$   
Merge sort for sorted data?  $n \log n$

Good Luck  
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