

Quiz 2 Practice Problems

1 Sorting

1. Fill in either True or False for whether each sorting algorithm is in-place and stable. Also fill in the running time in terms of the number of elements n and the range of the elements k .

	in-place	stable	running time
Insertion Sort			
Counting Sort			
Selection Sort			
Heap Sort			
Merge Sort			
Radix Sort			

2. Given a list of n positive integers all less than $k = n^2$, would you rather use Counting Sort or Selection Sort? Why?

2 Heaps

1. Show that, with the array representation for storing an n -element heap, the leaves are the nodes indexed by $\lfloor \frac{n}{2} \rfloor + 1, \dots, n$

2. Is the sequence $\langle 21, 15, 18, 8, 12, 11, 16, 4, 9 \rangle$ a max-heap? Justify.

3 DFS

Prove or disprove: Given two vertices u and v with discovery times $d[u] > d[v]$, u must be a descendant of v in G .

4 Shortest Paths

You have an undirected weighted graph G , a source s , shortest path estimates $d[u] = 50$ and $d[v] = 40$, and an edge with weight $w(u, v) = 5$.

1. What happens when you call `Relax(u, v)`?
2. What happens when you call `Relax(v, u)`?
3. If you are told that the shortest path weight $\delta(s, u) = 45$, what can you say about the shortest path weight $\delta(v, u)$? Why?