Feedback — Problem Set-5

You submitted this quiz on **Thu 28 Feb 2013 10:59 AM CET**. You got a score of **5.00** out of **5.00**.

Question 1

Consider a directed graph with distinct and nonnegative edge lengths and a source vertex s. Fix a destination vertex t, and assume that the graph contains at least one s-t path. Which of the following statements are true? [Check all that apply.]

Your Answer		Score	Explanation
☑ There is a shortest s-t path with no repeated vertices (i.e., a "simple" or "loopless" such path).	✓	0.25	
☑ The shortest (i.e., minimum-length) s-t path might have as many as $n-1$ edges, where n is the number of vertices.	✓	0.25	
☐ The shortest s-t path must include the minimum-length edge of G.	✓	0.25	
☐ The shortest s-t path must exclude the maximum-length edge of G.	✓	0.25	
Total		1.00 / 1.00	

Question 2

Consider a directed graph $G = (V, E)$ and a source vertex s with the following properties: edges that leave the source vertex s have arbitrary (possibly negative) lengths; all other edge lengths are nonnegative; and there are no edges from any other vertex to the source s. Does Dijkstra's shortest-path algorithm correctly compute shortest-path distances (from s) in this graph?

Your Answer		Score	Explanation
Always	✓	1.00	One approach is to see that the proof of correctness from the videos still works. A slicker solution is to notice that adding a positive constant M to all edges incident to s increases the length of every s-v path by exactly M, and thus preserves the shortest path.
Total		1.00 / 1.00	

Question 3

Suppose you implement the functionality of a priority queue using a *sorted* array (e.g., from biggest to smallest). What is the worst-case running time of Insert and Extract-Min, respectively? (Assume that you have a large enough array to accommodate the Insertions that you face.)

Your Answer		Score	Explanation
$\Theta(n)$ and $\Theta(1)$	✓	1.00	
Total		1.00 / 1.00	

Question 4

Suppose you implement the functionality of a priority queue using an *unsorted* array. What is the worst-case running time of Insert and Extract-Min, respectively? (Assume that you have a large enough array to accommodate the Insertions that you face.)

Your Answer		Score	Explanation
$\Theta(1)$ and $\Theta(n)$	✓	1.00	
Total		1.00 / 1.00	

Question 5

You are given a heap with n elements that supports Insert and Extract-Min. Which of the following tasks can you achieve in $O(\log n)$ time?

Your Answer		Score	Explanation
Find the fifth-smallest element stored in the heap.	✓	1.00	
Total		1.00 / 1.00	