# Feedback — Problem Set-5

You submitted this quiz on **Sat 21 Nov 2015 8:37 AM PST**. You got a score of **1.75** out of **5.00**. You can attempt again in 1 minutes.

## 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). | ✖ | 0.00 | |
| ☑ 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 | | 0.75 / 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 | | | |
| ⦿ Maybe, maybe not (depends on the graph) | ✘ | 0.00 | |
| ○ Never | | | |
| ○ Only if we add the assumption that $G$ contains no directed cycles with negative total weight. | | | |
| Total | | 0.00 / 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 |
|---|---|---|---|
| ○ $\Theta(1)$ and $\Theta(n)$ | | | |
| ○ $\Theta(n)$ and $\Theta(1)$ | | | |
| ⦿ $\Theta(\log n)$ and $\Theta(1)$ | ✘ | 0.00 | |
| ○ $\Theta(n)$ and $\Theta(n)$ | | | |
| Total | | 0.00 / 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 $\Theta(\log n)$ | ✖ | 0.00 | |
| ○ $\Theta(n)$ and $\Theta(n)$ | | | |
| ○ $\Theta(1)$ and $\Theta(n)$ | | | |
| ○ $\Theta(n)$ and $\Theta(1)$ | | | |
| Total | | 0.00 / 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 |
| --- | --- | --- | --- |
| ○ None of these. | | | |
| ⊙ Find the fifth-smallest element stored in the heap. | ✔ | 1.00 | |
| ○ Find the median of the elements stored in the heap. | | | |
| ○ Find the largest element stored in the heap. | | | |
| Total | | 1.00 / 1.00 | |