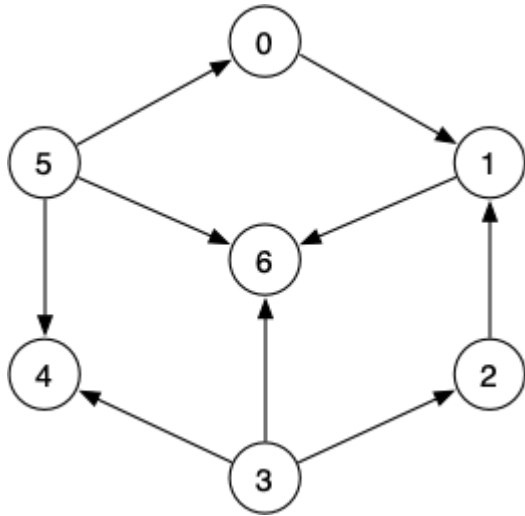


Quiz 5

Deadline	Saturday, 18 July 2020 at 11:59PM
Latest Submission	<i>no submission yet</i>
Maximum Mark	4

Question 1 (1 mark)

Which vertices are *reachable* from vertex 3 in the following directed graph



Reminder: $\text{reachable}(v,w)$ = there is a path from v to w

(a) <input type="radio"/>	none
(b) <input type="radio"/>	2, 4, 6
(c) <input type="radio"/>	1, 2, 4, 6
(d) <input type="radio"/>	1, 2, 4, 5, 6
(e) <input type="radio"/>	0, 1, 2, 4, 5, 6
(f) <input type="radio"/>	None of the above

Question 2 (1 mark)

Which of the following would require both *weighted and directed* edges in order to be represented as a graph?

(a) <input type="radio"/>	Facebook friends (people and their "friends")
(b) <input type="radio"/>	The Web (pages and URLs)
(c) <input type="radio"/>	The road network (incl. distances and one-way streets)
(d) <input type="radio"/>	Dependencies between files in a Makefile
(e) <input type="radio"/>	None of the above scenarios require both weight and direction.
(f) <input type="radio"/>	All of the above scenarios require both weight and direction.

Question 3 (1 mark)

A *transitive closure* matrix indicates *reachability* in a graph. An entry in this matrix $tc[v][w]$ is set to 1 if there is a path from v to w , otherwise is set to zero.

For a graph with V vertices, this requires V^2 matrix cells. Storing each cell as an integer is wasteful. However, since each cell only has to store 1 or 0, we could store each cell as a single bit in a bit-string.

For a graph with 1000 vertices, how many bytes would be needed to store the transitive closure matrix if each row was represented by a V -bit bit-string? You can ignore the array of pointers to each matrix row; just count the bytes required for the bit-strings.

(a) <input type="radio"/>	1000000 bytes
(b) <input type="radio"/>	125000 bytes
(c) <input type="radio"/>	100000 bytes
(d) <input type="radio"/>	10000 bytes
(e) <input type="radio"/>	None of the above

Question 4 (1 mark)

In Dijkstra's algorithm for single-source shortest path, there are two arrays: $pred[]$ and $dist[]$.

What is each of these arrays used for?

(a) <input type="radio"/>	<p>$pred[v]$ indicates the predecessor of v (e.g. 2 is predecessor of 3)</p> <p>$dist[v]$ is the length of the shortest path in which v is an intermediate node</p>
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(b) <input type="radio"/>	$pred[v]$ is an array of predicates indicating whether vertex v has been visited $dist[v]$ is the length of the edge along which v was reached on the shortest path
(c) <input type="radio"/>	$pred[v]$ is the predecessor of v in the shortest path $dist[v]$ is the distance between v and its predecessor
(d) <input type="radio"/>	$pred[v]$ holds the vertex immediately before v along the shortest path $dist[v]$ is the length of the shortest path from the source to vertex v
(e) <input type="radio"/>	None of the above

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