CMPSC 465 Data Structures & Algorithms
Fall 2025 Ke Chen and Yana Safonova

Quiz 4

Lecture Section: **Monday, Sep 29, 2025**

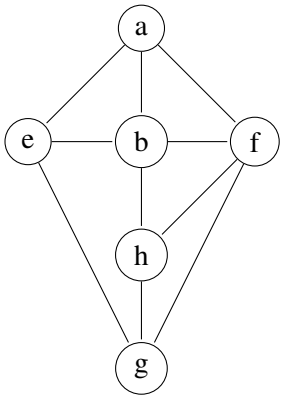
Student Name: **PSU Email ID:**

1. (2 pts.) We have a graph with n vertices stored in an adjacency list. How much time will it take to verify that a single edge exists using the adjacency list (stored as an array)?

(a) $O(n \log n)$
(b) $O(n)$
(c) $O(1)$
(d) $O(n^2)$

Answer (b) $O(n)$
Looking up a single edge requires iterating through a list of up to n elements.

2. (2 pts.) Consider the following graph,



Which of the following are plausible DFS traversals of the graphs? **Mark all correct answers**.

(a) a b f e h g
(b) a b f h g e
(c) a f b e h g
(d) g e b a f h

Answer (b) and (d) "g e b a f h" and "a b f h g e"
DFS explores all available neighbors before backtracking.

3. (2 pts.) What is the maximum number of edges possible in a simple undirected graph having n vertices?

(a) $\frac{n(n+1)}{2}$
(b) $\frac{n(n-1)}{2}$
(c) $n(n-1)$

Answer (b) $\frac{n(n-1)}{2}$
Number of pairs of n vertices is $\binom{n}{2} = \frac{n(n-1)}{2}$.

4. (2 pts.) The topological sort of a Directed Acyclic Graph (DAG) is always unique.

(a) True
(b) False

Answer (b) False

5. (2 pts.) In a DFS tree, back edges are defined as:

(a) Edges that lead to the root node.
(b) Edges that point into the current node.
(c) Edges that lead to a child node.
(d) Edges that lead to an ancestor node.

Answer (d) Edges that lead to an ancestor node.