Quiz 3 of 4 – Practice Version

Student Number	***Student Name***

This is a closed book exam. No calculators, cellphones, laptops, or other aids are permitted. Answer all questions in the space provided. Show all your work - correct answers presented without justification may receive a mark of zero.

1. Using only the set identities provided (i.e., Venn diagrams or membership tables will receive no marks for this question) prove (using the techniques as they have been demonstrated in class) the equivalence of:

$$(Y - X) \cap (Z - X) \text{ and } (Y \cap Z) \cap \bar{X}$$

[6 marks]

2. Produce a complete membership table for $\bar{C} - \overline{(B \cap \bar{A})}$. Ensure that you fill the table completely and provide every column. [4 marks]

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3. Answer the following questions about the graph included on the following page. [15 marks]

   a. What is the degree of vertex 1?

   b. What vertices are adjacent to vertex 2?

   c. How many cut vertices exist in this graph?

   d. What is $\sum_{v \in V} \deg(v)$?

   e. A clique is a subgraph G' = (V', E') that is complete (i.e., every vertex in the clique is connected to every other vertex in the clique). What is the largest clique contained in this graph? Note both the size and the vertices in V'.

   f. In what order would the vertices be visited by a BREADTH-first search starting from vertex 4? You may assume that if your algorithm ever needs to make a decision about which adjacent vertex to visit, it will visit the next one in numerical order. Your solution to this question must be a list of vertices in the format "1 → 2 → 3 → 4".

   g. In what order would the vertices be visited by a DEPTH-first search starting from vertex 6? You may assume that if your algorithm ever needs to make a decision about which adjacent vertex to visit, it will visit the next one in numerical order. Your solution to this question must be a list of vertices in the format "1 → 2 → 3 → 4".

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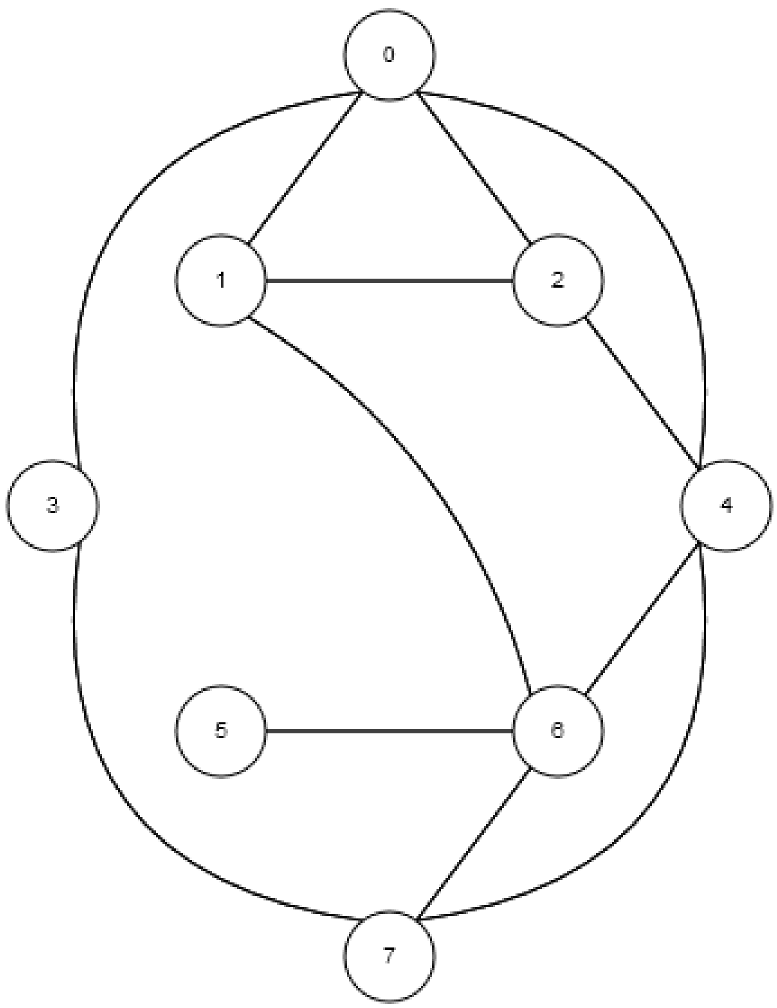

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$A \cap U = A$ }	Identity	{ $A \cup \emptyset = A$
$A \cup U = U$ }	Domination	{ $A \cap \emptyset = \emptyset$
$A \cap A = A$ }	Idempotence	{ $A \cup A = A$
$A \cup \bar{A} = U$ }	Complement	{ $A \cap \bar{A} = \emptyset$
$\overline{A \cap B} = \bar{A} \cup \bar{B}$ }	DeMorgan's Law	{ $\overline{A \cup B} = \bar{A} \cap \bar{B}$
$A \cap B = B \cap A$ }	Commutativity	{ $A \cup B = B \cup A$
$(A \cap B) \cap C = A \cap (B \cap C)$ }	Associativity	{ $(A \cup B) \cup C = A \cup (B \cup C)$
$A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$ }	Distributivity	{ $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$
$A \cap (A \cup B) = A$ }	Absorption	{ $A \cup (A \cap B) = A$
$A - B = A \cap \bar{B}$ }	Difference Equivalence	
$\bar{\bar{A}} = A$ }	Double Complement / Involution	