

Some CPSC 259 Sample Exam Questions on Graph Theory (Part 6)

If you are studying for a midterm, please note that you are only responsible for material covered (so far) in class. Secondly, if you are studying for the final exam, and encounter a topic not covered in the current version of the course, you can safely ignore it. Ask on the course Discussion Board, if you're unsure.

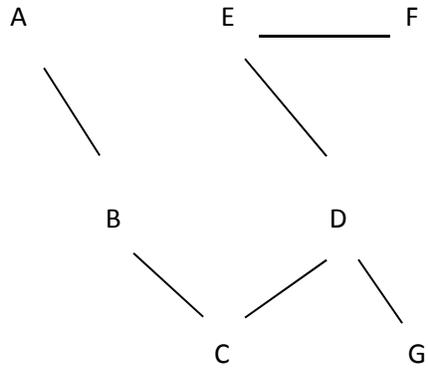
1. {3 marks} Can a simple graph have 5 vertices and 12 edges? If so, draw it; if not, explain why it is not possible to have such a graph.

2. {6 marks} Suppose that in a group of 5 people: A, B, C, D, and E, the following pairs of people are acquainted with each other.
 - A and C
 - A and D
 - B and C
 - C and D
 - C and E
 - a) Draw a graph G to represent this situation.
 - b) List the vertex set, and the edge set, using set notation. In other words, show sets V and E for the vertices and edges, respectively, in $G = \{V, E\}$.
 - c) Draw an adjacency matrix for G .

3. {3 marks} How many *more* edges are there in the complete graph K_7 than in the complete graph K_5 ?

4. {4 marks} Given a graph for a tree (with no designated root), briefly describe how a root can be chosen so that the tree has *maximum* height. Similarly, describe how a root can be chosen so that the tree has *minimum* height. (Note that path length is described as the number of edges that need to be traversed between two vertices.)

5. {6 marks} Perform a *breadth-first search* of the following graph, where E is the starting node. In other words, show the output if we issue the call $\text{BFS}(E)$. Provide two cases: (a) Use a counterclockwise ordering from the top (12 o'clock position); and (b) Use a clockwise ordering from the top.



6. {6 marks} Perform a *depth-first search* of the same graph as in Question 5, but use D as the starting node. In other words, show the output if we issue the call $\text{DFS}(D)$. Provide two cases: (a) Use a counterclockwise ordering from the top (12 o'clock position); and (b) Use a clockwise ordering from the top.