

Computer Science 221

Practice Questions - Set 6

Here are some more sample questions to help you prepare for the final exam.

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

2. 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 to represent this situation.

(b) Draw a graph that illustrates who among these 5 people are *not* acquainted. That is, draw an edge between two people if, and only if, they are not acquainted.

3. (This one's a little harder, but it's an interesting graph application.) Eleven faculty members in a mathematics department serve on the following committees:

Undergraduate Education:	Bergen, Jones, Kashina, Cohen
Personnel:	Moussa, Wang, Cortzen
Graduate Education:	Gatto, Moussa, Cohen, Catoiu
Hiring:	Gatto, Goldman, Moussa, Jones
Colloquium:	Sahin, Goldman, Ash
Library:	Cortzen, Bergen, Sahin

The committee must all meet during the first week of classes, but there are only three time slots available. Find a schedule that will allow all faculty members to attend the meetings of all committees on which they serve. To do this, represent each committee as the vertex of a graph, and draw an edge between two vertices if the two committees have a common member (this will tell us not to schedule these two committees at the same time).

4. (a) Draw a graph with 3 vertices that is bipartite.
(b) Draw a graph with 4 vertices that is bipartite.
5. Which of these non-planar graphs have the property that the removal of any vertex and all edges incident with that vertex produces a planar graph? Justify your answers.
- (a) K_5
 - (b) K_6
 - (c) $K_{3,3}$
 - (d) $K_{3,4}$