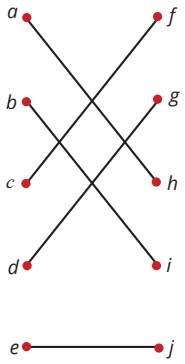
Skill Check Answers

1. Yes **2.** $N(B) = \{f, g, i\}$

3. Answers will vary. For example,



14.3 Exercises

✔ CONCEPT CHECK

1. A _____ is one in which the vertices can be broken into two distinct groups where each vertex in the first group is joined to a vertex in the second group.

2. By Hall's Marriage Theorem, we know that a _____ graph has a matching.

3. A _____ is a subset of edges in a graph so that each vertex is incident with only one edge.

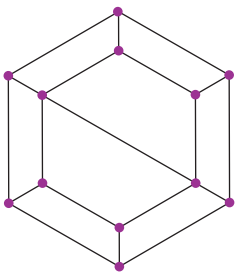
4. In a _____, every vertex has the same degree.

5. Given a set of vertices A, the _____ of A is the set of all vertices adjacent to a vertex in A.

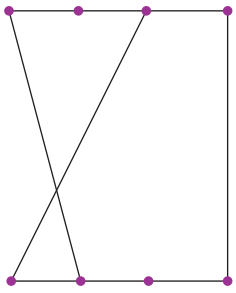
PRACTICE

Determine if each graph is bipartite. Justify your answer.

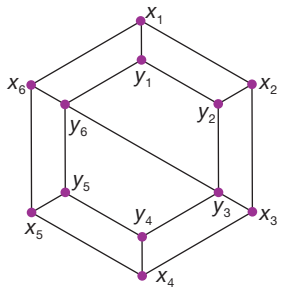
6.



7.



Use Graph Q to identify the neighborhood of each set.



Graph Q

8. $A = \{x_1, y_1\}$

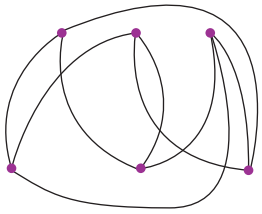
9. $B = \{\text{the set of odd numbered } x\text{'s}\}$

10. $C = \{y \text{ vertices}\}$

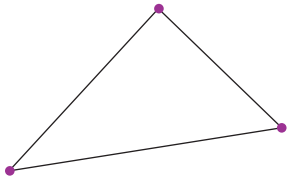
11. $D = \{\text{all vertices in } Q\}$

Determine if each graph has a matching. Justify your answer.

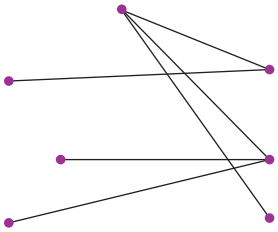
12.



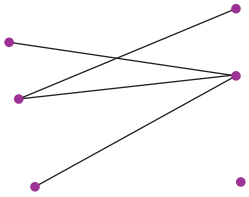
13.



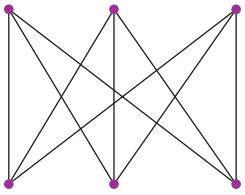
14.



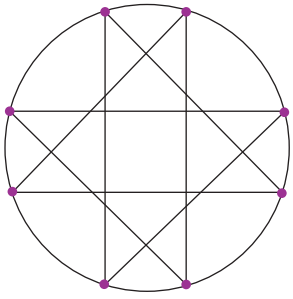
15.



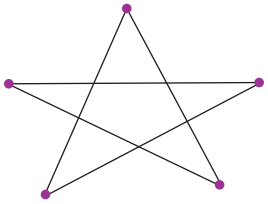
16.



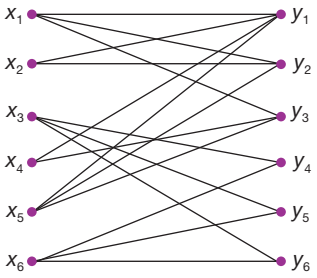
17.



18.

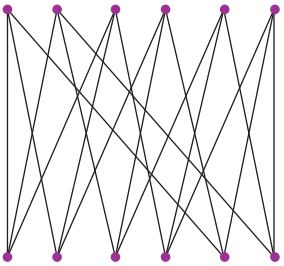


19. Use Hall's Marriage Theorem to determine if there is a matching in the following graph.

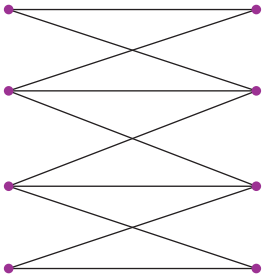


Determine if each graph is regular bipartite.

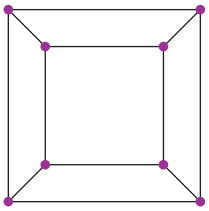
20.



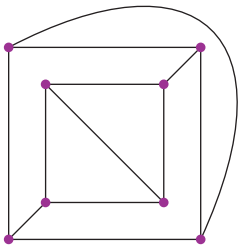
21.



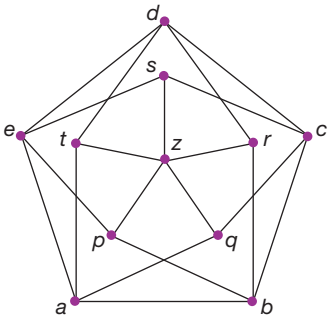
22.



23.

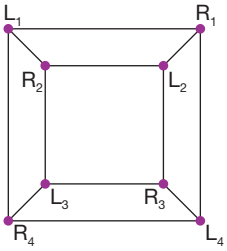


24. Is Grötzsch's graph bipartite?

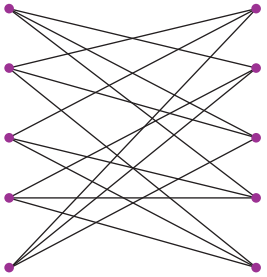


Find a matching in each regular bipartite graph.

25.



26.



Form a bipartite graph from the information in each table. Find a matching for each scenario, if possible.

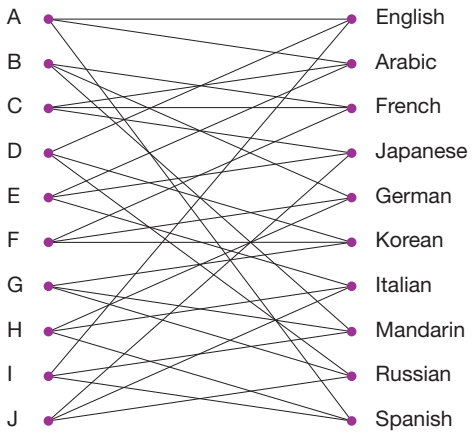
27.

Teacher	Courses
Mr. Hall	Political Science, American History
Ms. Cutlidge	English I, English II, English III, Advanced Writing, Computer Science
Mrs. Roseview	English I, English II, English III, Advanced Writing
Mr. Burden	Algebra II, Precalculus, Calculus, PE
Mr. Smith	American History, US History, Economics, Political Science
Mrs. Jones	Political Science, US History, PE, Computer Science
Ms. Rodriguez	Algebra I, Algebra II, Geometry, Calculus

28.

Volunteers	Positions Willing to Serve In
Kerri	greeter, usher, refreshments
Luke	parking attendant, usher
Ron	sound board, video, lights
Jose	lights, parking attendant, greeter
Cho	nursery, sound board, video
Mia	refreshments, nursery, greeter
Margaret	parking attendant, refreshments, lights
Lenton	video, nursery, greeter

29. Use Schriver's Algorithm to find a matching of the British Museum example given in the text. We know from the text that it is a regular bipartite graph, and hence does have a matching.



WRITING & THINKING

30. Let graph G be a bipartite graph with the same number of vertices on each side. Suppose that for every set of vertices B on the right-hand side, the number of vertices in $N(B)$ on the left-hand side is at least as large as the number of vertices in B. Explain why graph G has a matching from the left-hand side to the right-hand side.

31. An edge coloring of a graph G is an assignment of colors to the edges, so that incident edges have different colors. Explain why edges of the same color form a matching.