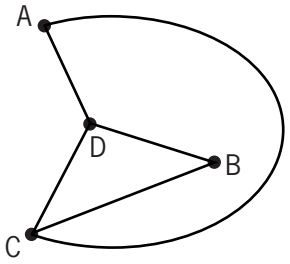
NAME

Module 20 Solving Problems Using Probability, Statistics, and Discrete Math

Lesson 4 Solving Discrete Mathematics Problems

additional practice

Use the following graph for Questions 1–3. The graph represents bus routes.

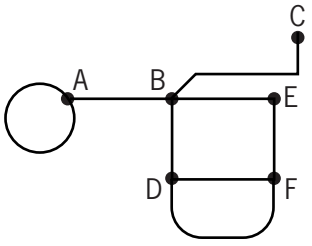


1. Find the degree of the vertices. **Vertex A: 2, Vertex B: 2; Vertex C: 3; Vertex D: 3**

2. Melissa wants to travel each of the routes on the map. Is there a traversable path she could take so that she travels each route exactly once? **Yes, there is a traversable path because there are exactly two vertices, C and D with odd degrees.**

3. If there is a traversable path, give the path. If not, explain the reason there is not a traversable path. **Possible answer: C-B-D-A-C-D. Note all paths must begin and/or end with C and D.**

Use the following graph for Questions 4–6. The graph represents the streets in a neighborhood. Harry delivers newspapers throughout this neighborhood on his bicycle. At least one house on each street receives a paper.

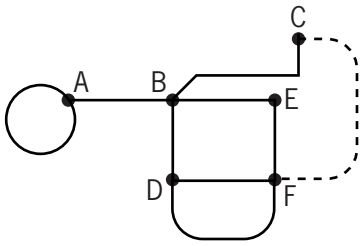


4. Vertex A has a "loop." The degree of vertex A is 3. Find the degrees of the remaining vertices. **Vertex B: 4; Vertex C: 1; Vertex D: 3; Vertex E: 2; Vertex F: 3**

5. Harry needs to bike down each street. Is there a traversable path he could take so that he bicycles each street exactly once? **No, there is not a traversable path because each vertex does not have an even degree, and there are four vertices with odd degrees.**

6. If there is a traversable path, give the path. If not, explain the reason there is not a traversable path. **If each vertex has an even degree or there are exactly two vertices with an odd degree, there is a traversable path. But in this graph there are four vertices with an odd degree, so no traversable path exists.**

Use the following graph for Questions 7 and 8. The town council is proposing to add a new road to the neighborhood as shown with the dotted line.

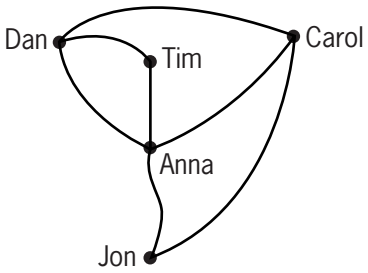


7. With the new street, does Harry have a traversable path?

With the new street, the degree of vertex C is now 2, and the degree of vertex F is now 4, so there are now exactly two vertices with an odd degree: A and D. So yes, there is a traversable path when the new street is added.

8. If there is a traversable path, give the path. If not, explain the reason there is not a traversable path. **Possible answer: D-F-E-B-C-F-D-B-A-A. Note all paths must begin and/or end with A and D because they have the two odd degrees.**

Use the following graph for Questions 9–11. The graph represents e-mail messages sent between friends last week.



9. What does the edge between vertex "Anna" and vertex "Tim" represent?

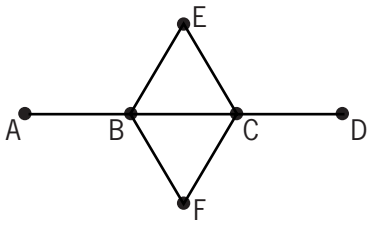
The edge shows that Anna and Tim communicated via e-mail last week.

10. Who communicated with the most people via e-mail last week? **Anna**

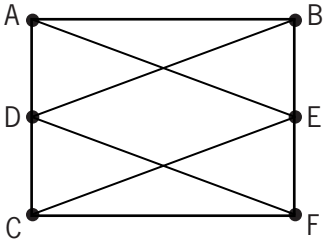
11. Who communicated via e-mail with Jon? **Anna and Carol**

For each problem, match each graph with its equivalent graph in the second column and write its corresponding letter as the answer.

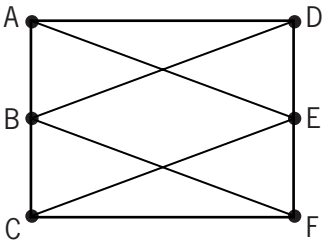
12. **b**



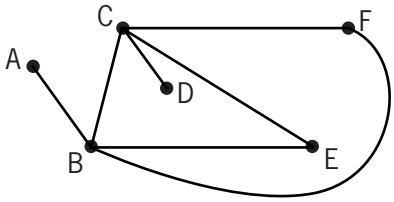
a.



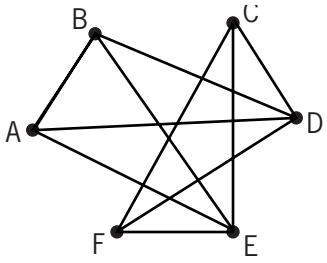
13. **c**



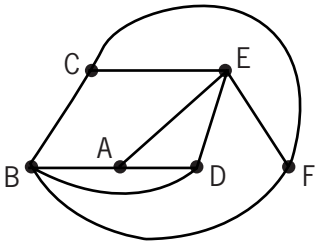
b.



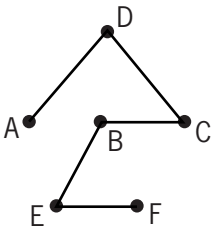
14. **a**



c.



15. **d**



d.