

Name: \_\_\_\_\_

**Exam 1 Version D**  
**Monday, September 15, 2014**

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**Academic Honesty Pledge**

*Your signature at the bottom indicates your agreement to abide by the following rules.*

1. All purses, bags, books, notes, and other papers are placed in the designated area of the classroom.
2. All electronic devices (including cell phones) are placed in the designated area of the classroom.
3. I will not communicate with other students during the exam.
4. I will not seek help from or give help to others during the exam.
5. I will turn my exam in and will not take it from the classroom.
6. I will not discuss the exam outside of class with another student who has not yet taken the exam.
7. I will not cheat in any other way.
8. I will follow any other instructions from my professor.

Signature: \_\_\_\_\_

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**Good Luck!**

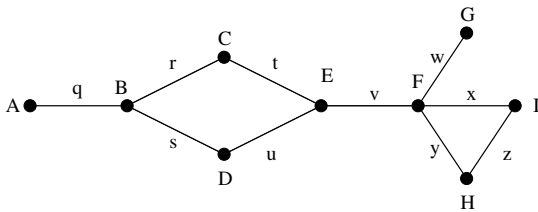
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Name: \_\_\_\_\_ Score: \_\_\_\_\_ /100

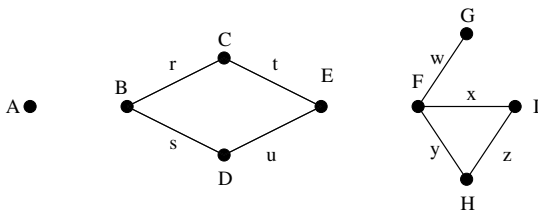
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1. (20 pts) Consider the graph pictured.



- (a) How many edges does the graph have?
- (b) How many vertices does the graph have?
- (c) How many components does the graph have?
- (d) What is the degree of vertex  $I$ ?
- (e) What is the degree of vertex  $B$ ?
- (f) List all bridges in the graph.
- (g) List all vertices adjacent to vertex  $E$ .
- (h) List all edges adjacent to edge  $r$ .

2. (10 pts) Consider the graph pictured.



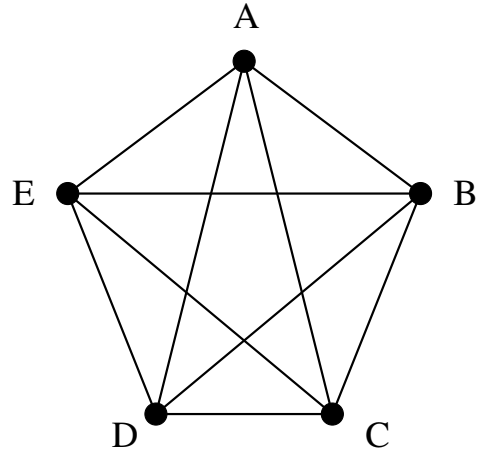
- (a) How many edges does the graph have?
- (b) How many vertices does the graph have?
- (c) How many components does the graph have?
- (d) What is the degree of vertex  $A$ ?
- (e) What is the degree of vertex  $F$ ?

3. (15 pts) Consider the graph pictured to the right. *List all paths and circuits as a sequence of vertices.*

(a) Find an Euler Circuit beginning at vertex  $D$  or explain why none exists.

(b) Find a Hamilton Circuit beginning at vertex  $A$  or explain why none exists.

(c) Find a Hamilton Path from vertex  $C$  to vertex  $A$  or explain why none exists.

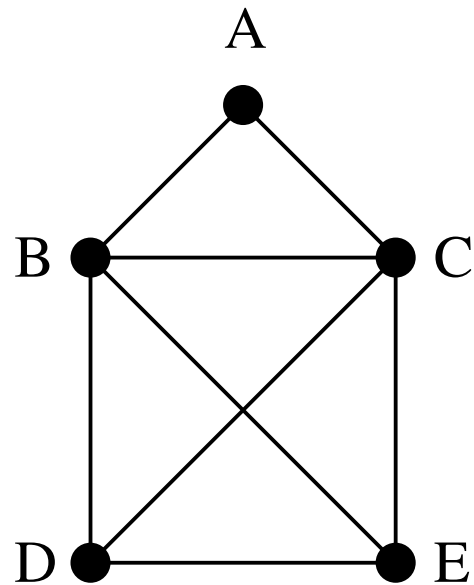


4. (15 pts) Consider the graph pictured to the right. *List all paths and circuits as a sequence of vertices.*

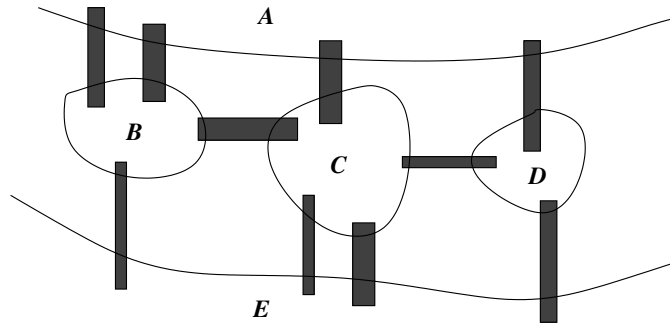
(a) Find an Euler Circuit beginning at vertex  $E$  or explain why none exists.

(b) Find an Euler Path beginning at vertex  $D$  or explain why none exists.

(c) Find an Euler Path beginning at vertex  $B$  or explain why none exists.



5. (20 pts) The city of Bridgeburgh has ten bridges (shaded) and land masses labeled  $A, B, C, D, E$ , as pictured.

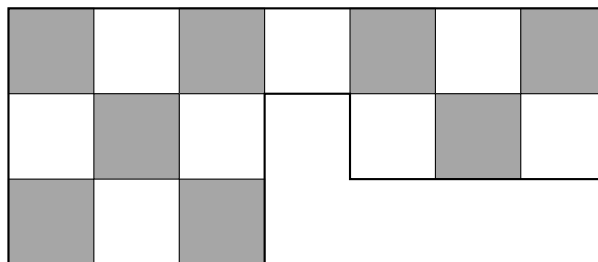


(a) Represent this as a graph.

(b) Can the residents of Bridgeburgh perambulate the town, crossing each bridge exactly once? If so, give a possible route. If not, explain why not.

(c) Can the residents of Bridgeburgh perambulate the town, beginning and ending at the same place, and crossing each bridge exactly once? If so, give a possible route. If not, explain why not.

6. (20 pts) Consider a Pennies and Paperclips Game with Board 3, shown.



(a) **Conjecture A:** *If Penny plays both pennies on the same color squares, Penny is guaranteed to win.*

- i. Circle one: TRUE or FALSE
- ii. Proof or counter example:

(b) **Conjecture B:** *If Penny plays the pennies on different color squares, Paperclip is guaranteed to win.*

- i. Circle one: TRUE or FALSE
- ii. Proof or counter example: