Name:_____

NetID:_____   **Lecture:**   **A**   **B**

Discussion: **Thursday**   **Friday**   **9**   **10**   **11**   **12**   **1**   **2**   **3**   **4**   **5**   **6**

(9 points) How many cycle subgraphs (i.e. subgraphs isomorphic to C_n for some n) does the graph below contain? Count two cycles as the same if they have the same set of nodes and the same set of edges. Don't worry about which node is the start/end node. Briefly justify and/or show work.

(2 points) Is the above graph acyclic?

(2 points) Does the above graph have an Euler circuit?

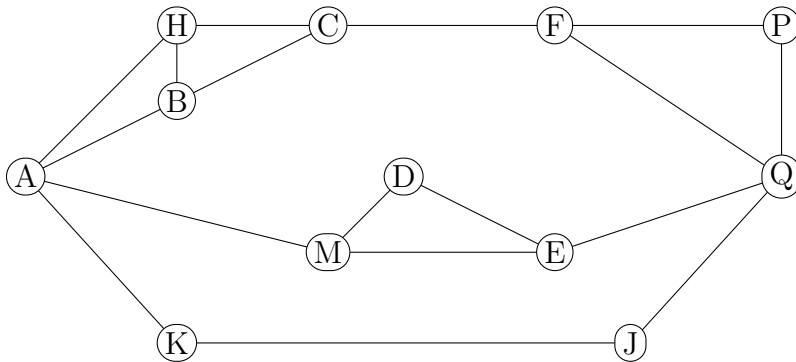(2 points) What is the largest complete (K_n) subgraph of the above graph?

Name:_____

NetID:_____   **Lecture:**   A   B

Discussion: **Thursday**   **Friday**   **9**   **10**   **11**   **12**   **1**   **2**   **3**   **4**   **5**   **6**

(9 points) How many paths are there from A to Q in the graph below? Explain or show work.

(2 points) Does the above graph contain a 4-node cycle?

(2 points) How many connected components does the above graph have?

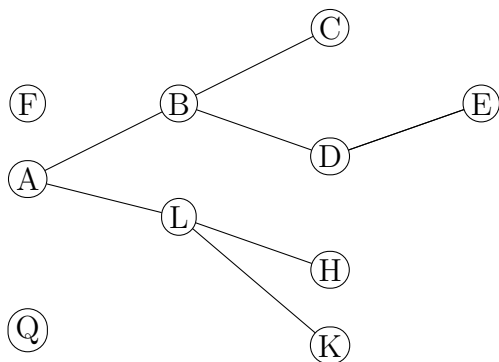(2 points) What is the largest complete (K_n) subgraph of the above graph?

Name:————————————————————————

NetID:————————————————   **Lecture:**   A   B

Discussion: **Thursday   Friday   9   10   11   12   1   2   3   4   5   6**

(9 points) In the graph below, how many paths are there from one node to a distinct (aka different) node? Consider all choices of start and end nodes. Explain or show work.

(2 points) Is the above graph acyclic?

(2 points) How many connected components does the above graph have?

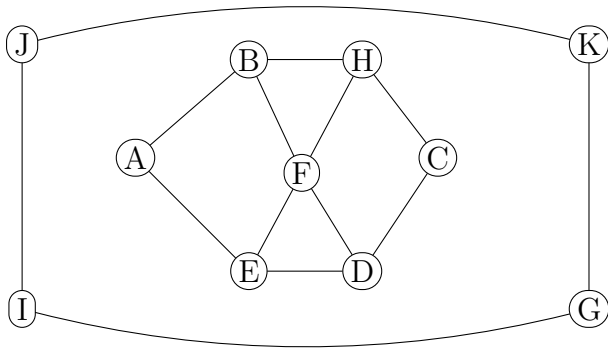(2 points) What is the largest complete (K_n) subgraph of the above graph?

Name:_____

NetID:_____   **Lecture:**   A   B

Discussion: **Thursday**   **Friday**   **9**   **10**   **11**   **12**   **1**   **2**   **3**   **4**   **5**   **6**

(9 points) How many paths are there from A to C in the graph below? Explain or show work.

(2 points) Does the above graph contain a 6-node cycle?

(2 points) How many connected components does the above graph have?
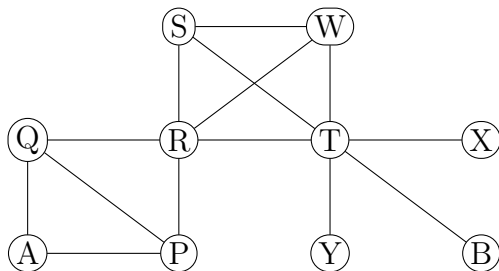
(2 points) Is the above graph bipartite?

Name:_____

NetID:_____   **Lecture:**   **A**   **B**

Discussion: **Thursday**   **Friday**   **9**   **10**   **11**   **12**   **1**   **2**   **3**   **4**   **5**   **6**

(9 points)   How many cycle subgraphs (i.e. subgraphs isomorphic to C_n for some n) does the graph below contain? Count two cycles as the same if they have the same set of nodes and the same set of edges. Don't worry about which node is the start/end node. Briefly justify and/or show work.

(2 points) Does the above graph have a cut edge?

(2 points) How many connected components does the above graph have?
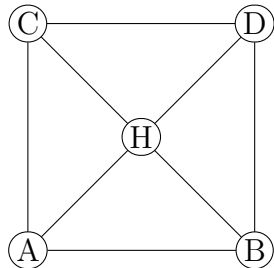
(2 points) What is the diameter of the above graph?

CS 173, Spring 19   Examlet 6, white

Name:

NetID: **Lecture:**   A   B

Discussion: **Thursday**   **Friday**   **9**   **10**   **11**   **12**   **1**   **2**   **3**   **4**   **5**   **6**

(9 points)   How many cycle subgraphs (i.e. subgraphs isomorphic to C_n for some n) does the graph below contain? Count two cycles as the same if they have the same set of nodes and the same set of edges. Don't worry about which node is the start/end node. Briefly justify and/or show work.

(2 points) What is the largest complete (K_n) subgraph of the above graph?

(2 points) How many connected components does the above graph have?
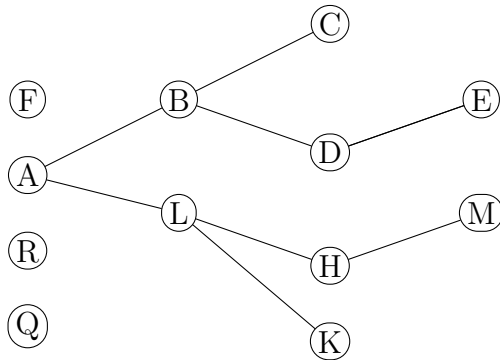
(2 points) What is the diameter of the above graph?

Name:⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

NetID:⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯   **Lecture:**   A   B

Discussion: **Thursday**   **Friday**   **9**   **10**   **11**   **12**   **1**   **2**   **3**   **4**   **5**   **6**

(9 points) How many paths are there in the graph below? Consider all choices of start and end nodes. Explain or show work.

(2 points) Is the above graph acyclic?

(2 points) How many connected components does the above graph have?

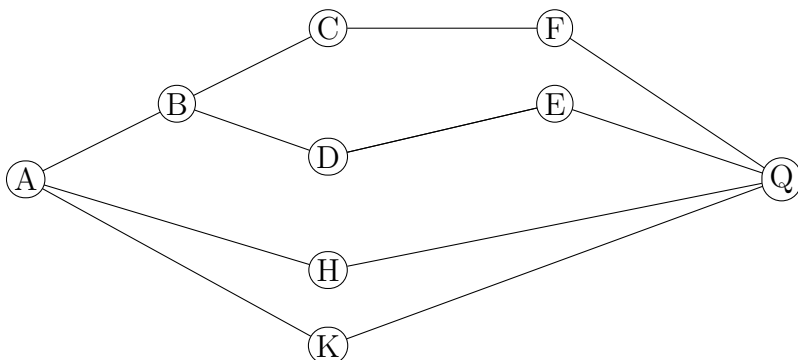(2 points) Is the above graph bipartite?

Name:

NetID: **Lecture:**   **A**   **B**

Discussion: **Thursday**   **Friday**   **9**   **10**   **11**   **12**   **1**   **2**   **3**   **4**   **5**   **6**

(9 points) How many cycle subgraphs (i.e. subgraphs isomorphic to C_n for some n) does the graph below contain? Count two cycles as the same if they have the same set of nodes and the same set of edges. Don't worry about which node is the start/end node. Briefly justify and/or show work.

(2 points) What is the diameter of the above graph?

(2 points) How many connected components does the above graph have?
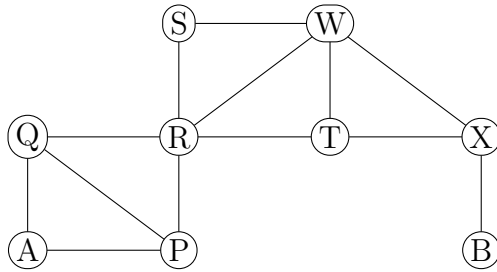
(2 points) Is the above graph bipartite?

CS 173, Fall 18   Examlet 6, Part B 1

Name:_____

NetID:_____   **Lecture:**   **B**

Discussion: **Friday**   **11**   **12**   **1**   **2**   **3**   **4**

(9 points) How many paths are there from A to B in the graph below? Explain or show work.

(2 points) How many connected components does the above graph have?

(2 points) What is the diameter of the above graph?
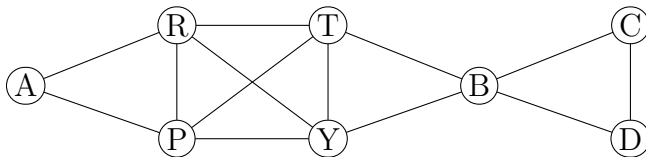
(2 points) Does the above graph have a cut edge?

Name:_____

NetID:_____   **Lecture:**   **B**

Discussion: **Friday**   **11   12   1   2   3   4**

(9 points) How many paths are there from A to C in the graph below? Explain or show work.

(2 points) How many connected components does the above graph have?

(2 points) Does the above graph have a cut edge?

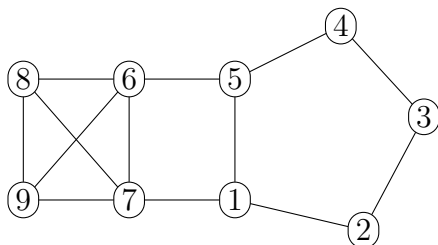(2 points) Does the above graph have an Euler circuit?
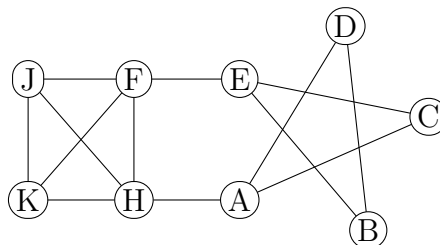
Name:_____

NetID:_____   **Lecture:**   **A**   **B**

Discussion: **Thursday**   **Friday**   **9**   **10**   **11**   **12**   **1**   **2**   **3**   **4**   **5**   **6**

1. (10 points)   Are graphs X and Y (below) isomorphic? Justify your answer.

Graph X   Graph Y

2. (5 points)   Use the pigeonhole principle to briefly explain why a graph with n nodes $(n \geq 2)$ must have two nodes with the same degree. Hint: if one node has degree 0, what is the maximum degree of any other node? How many possible degree values are there?
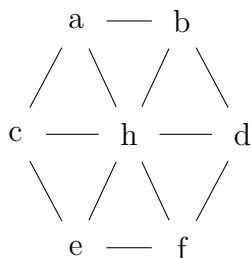
Name:

NetID: **Lecture:**   **A**   **B**

Discussion: Thursday   Friday   9   10   11   12   1   2   3   4   5   6

1. (10 points)   How many isomorphisms are there from G (below) to itself? Justify your answer and/or show your work clearly .

```
        a  —  b
       / \  / \
      c — h — d
       \ /  \ /
        e  —  f
```

2. (5 points) Complete this statement of the Handshaking Theorem.

   For any graph G with set of nodes V and set of edges E, ...

Name:

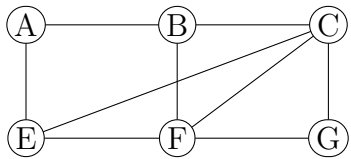**NetID:**   **Lecture: A   B**

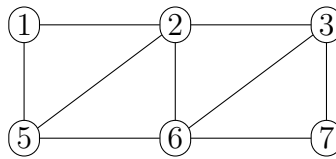**Discussion: Thursday   Friday   9   10   11   12   1   2   3   4   5   6**

1. (10 points)   Are graphs X and Y (below) isomorphic? Justify your answer.

   Graph X   Graph Y

2. (5 points) Show three distinct (i.e. not isomorphic) graphs, each of which has five nodes, three edges, and no cycles.
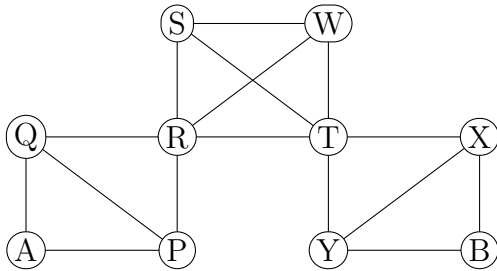
Name:—————————————————————————
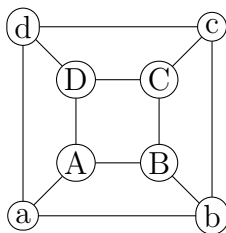
NetID:———————————   **Lecture:**   A   B

Discussion: **Thursday**   **Friday**   **9**   **10**   **11**   **12**   **1**   **2**   **3**   **4**   **5**   **6**

1. (10 points)   How many isomorphisms are there from G (below) to itself? Justify your answer and/or show your work clearly .

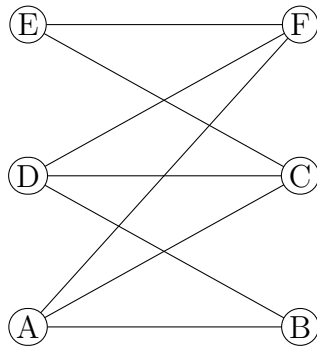2. (5 points) Is this graph bipartite? Briefly justify your answer.

Name:———————————————————————

NetID:———————————   **Lecture:**   A   B

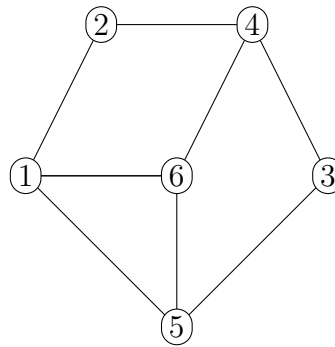**Discussion:**   **Thursday**   **Friday**   **9**   **10**   **11**   **12**   **1**   **2**   **3**   **4**   **5**   **6**

1. (10 points)   Are graphs X and Y (below) isomorphic? Justify your answer.

   Graph X   Graph Y

2. (5 points) Does the complete graph K_8 have an Euler circuit? Briefly justify your answer.
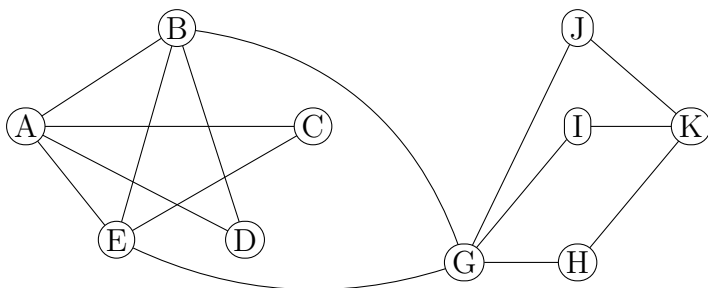
Name:———————————————————

NetID:———————————   **Lecture:**   A   B

Discussion: **Thursday**   **Friday**   9   10   11   12   1   2   3   4   5   6

1. (10 points)   How many isomorphisms are there from G (below) to itself? Justify your answer and/or show your work clearly .

2. (5 points) If G is a graph, its complement G' has the same nodes as G but G' has an edge between nodes x and y if and only G does not have an edge between x and y. Give a succinct high-level description of the complement of W_5 (5-cycle joined to a hub node). Briefly justify or show work.
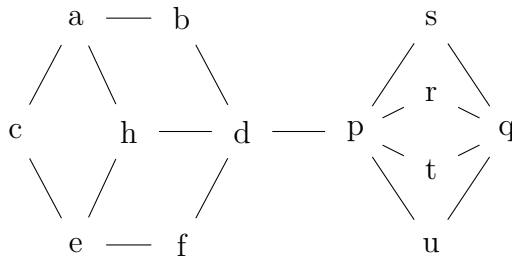
Name:_____

NetID:_____　　　　　**Lecture:**　　A　　B

Discussion:　　**Thursday**　　**Friday**　　9　　10　　11　　12　　1　　2　　3　　4　　5　　6

(9 points) How many paths are there from c to q in the graph below? Explain or show work.

(2 points) Is the above graph acyclic?

(2 points) How many connected components does the above graph have?

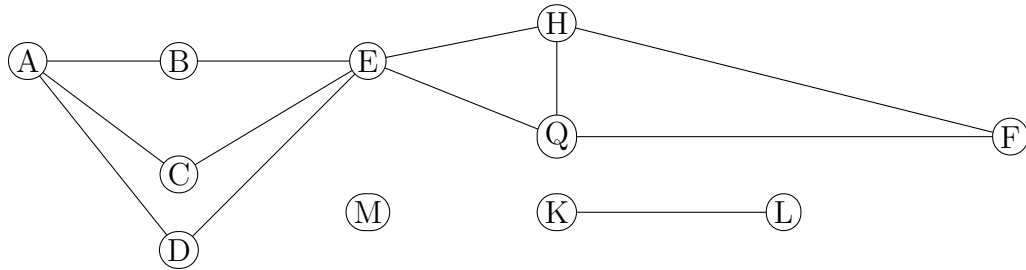(2 points) Does the above graph contain a 5-node cycle?

Name:_____

NetID:_____   **Lecture:**   **A**   **B**

Discussion: **Thursday**   **Friday**   **9**   **10**   **11**   **12**   **1**   **2**   **3**   **4**   **5**   **6**

(9 points) How many paths are there from A to F in the graph below? Explain or show work.

(2 points) Does the above graph contain a 5-node cycle?

(2 points) How many connected components does the above graph have?

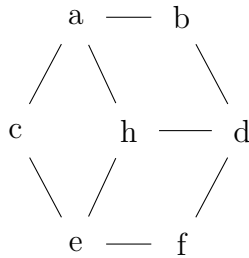(2 points) Does the above graph have an Euler circuit?

Name:_____

NetID:_____   **Lecture:**   **A**   **B**

Discussion: **Thursday**   **Friday**   **9**   **10**   **11**   **12**   **1**   **2**   **3**   **4**   **5**   **6**

(9 points) How many cycle subgraphs (i.e. subgraphs isomorphic to C_n for some n) does the graph below contain? Count two cycles as the same if they have the same set of nodes and the same set of edges. Don't worry about which node is the start/end node. Briefly justify and/or show work.

```
        a  —  b
       / \      \
      c   h  —  d
       \ /      /
        e  —  f
```

(2 points) Does the above graph have an Euler circuit?

(2 points) Is the above graph bipartite?

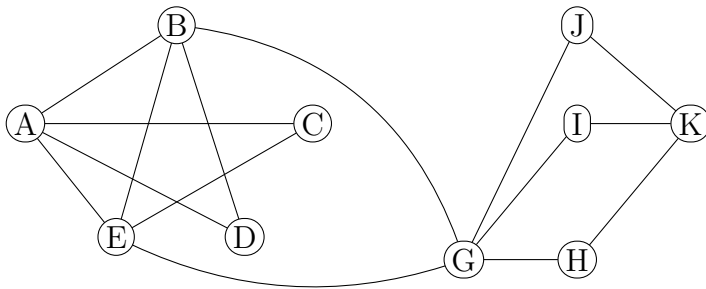(2 points) Does the above graph contain a 4-node cycle?

Name:_____

NetID:_____   **Lecture:**   A   B

Discussion: **Thursday**   **Friday**   **9   10   11   12   1   2   3   4   5   6**

(9 points) How many paths are there from A to K in the graph below? Explain or show work.

(2 points) Does the above graph contain a 5-node cycle?

(2 points) What is the diameter of the above graph?

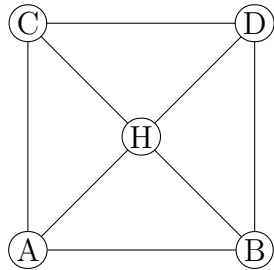(2 points) Is the above graph bipartite?

Name:——————————————————————

NetID:————————————   **Lecture:**   A   B

Discussion: **Thursday**   **Friday**   **9   10   11   12   1   2   3   4   5   6**

(9 points) How many paths are there from B to C in the graph below? Explain or show work.

(2 points) Is the above graph acyclic?

(2 points) Does the above graph have a cut edge?

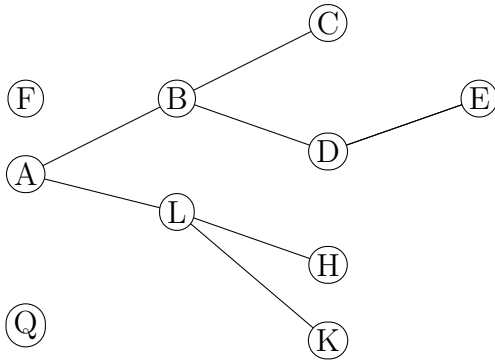(2 points) What is the diameter of the above graph?

Name:_____

NetID:_____   **Lecture:**   A   B

Discussion: **Thursday**   **Friday**   9   10   11   12   1   2   3   4   5   6

(9 points) How many paths are there in the graph below? Consider all choices of start and end nodes. Explain or show work.

(2 points) How many connected components does the above graph have?

(2 points) Is the above graph bipartite?

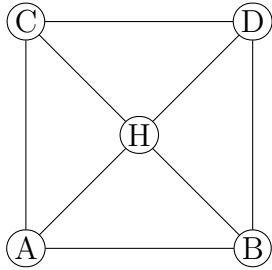(2 points) Does the above graph contain a 4-node cycle?

Name:_____

NetID:_____   **Lecture:**   A   B

Discussion: **Thursday**   **Friday**   **10**   **11**   **12**   **1**   **2**   **3**   **4**   **5**   **6**

(9 points) How many cycle subgraphs (i.e. subgraphs isomorphic to C_n for some n) does the graph below contain? Count two cycles as the same if they have the same set of nodes; don't worry about (for example) which node is the start/end node. Briefly justify and/or show work.

(2 points) What is the diameter of the above graph?

(2 points) Does the above graph have a cut edge?

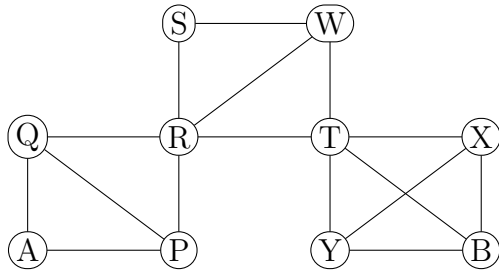(2 points) How many connected components does the above graph have?

Name:_____

NetID:_____   **Lecture:**   A   B

Discussion: **Thursday   Friday   10   11   12   1   2   3   4   5   6**

(9 points) How many paths are there from A to B in the graph below? Explain or show work.

(2 points) Does the above graph have an Euler circuit?

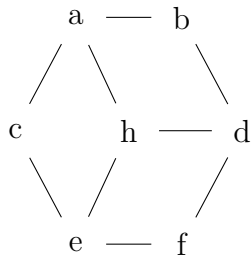(2 points) Is the above graph bipartite?

(2 points) How many connected components does the above graph have?

Name:_____

NetID:_____   **Lecture:**   A   B

Discussion: Thursday   Friday   10   11   12   1   2   3   4   5   6

(9 points) How many paths are there from a to f in the graph below? Explain or show work.

```
   a — b
  / \    \
 c   h — d
  \ / \ /
   e — f
```

(2 points) How many connected components does the above graph have?

(2 points) Is the above graph bipartite?

(2 points) Does the above graph contain a 6-node cycle?

Name:⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

NetID:⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯   **Lecture:**   A   B

Discussion: Thursday   Friday   10   11   12   1   2   3   4   5   6

(9 points) How many paths are there from h to d in the graph below? Explain or show work.

(2 points) Does the above graph have an Euler circuit?

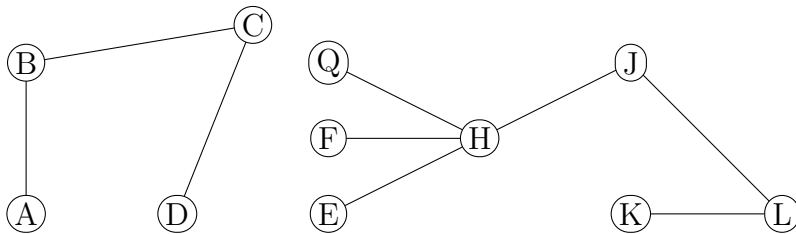(2 points) Is the above graph bipartite?

(2 points) Does the above graph contain a 6-node cycle?

Name:_____

NetID:_____   **Lecture:**   **A**   **B**

Discussion: **Thursday**   **Friday**   **10**   **11**   **12**   **1**   **2**   **3**   **4**   **5**   **6**

(9 points) How many paths are there (with any starting/ending points) in the graph below? Explain or show work.

(2 points) Is the above graph acyclic?

(2 points) How many connected components does the above graph have?

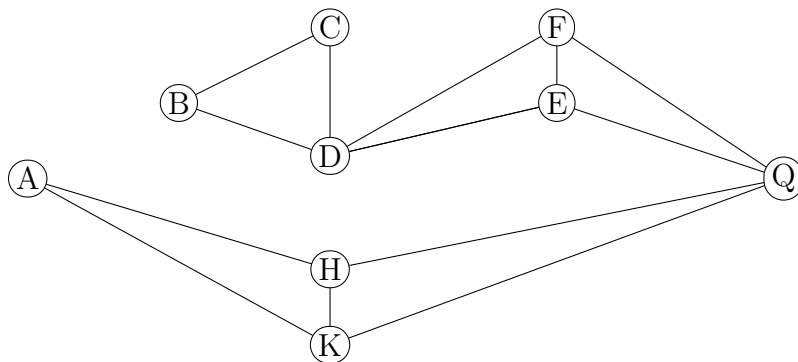(2 points) Does the above graph have a cut edge?

Name:——————————————————————

NetID:—————————————   **Lecture:**   **A**   **B**

Discussion: **Thursday**   **Friday**   **10**   **11**   **12**   **1**   **2**   **3**   **4**   **5**   **6**

(9 points) How many paths are there from A to B in the graph below? Explain or show work.

(2 points) How many connected components does the above graph have?

(2 points) Is the above graph acyclic?

(2 points) Does the above graph have an Euler circuit?