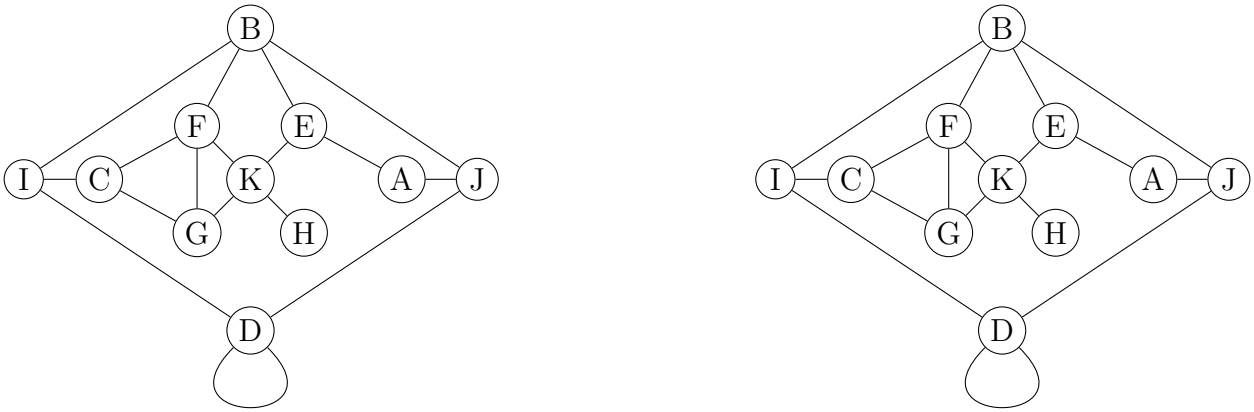
Worksheet 9 (Graph Theory 1): Pieces of Graphs

Group Names: _____

1. Graph Q is shown below (twice). Answer the questions:



   (a) How many vertices does graph Q have? _____

   (b) How many edges does graph Q have? _____

   (c) Degree of vertex A? _____

   (d) Degree of vertex H? _____

   (e) Degree of vertex D? (remember, loops count twice) _____

   (f) Label each vertex on the right-hand copy of the graph with its degree.

   (g) Which vertex/vertices has/have the largest degree? _____

   (h) Find a path from K to D. Draw it on the (left-hand) graph. How many edges does your path have? _____

   (i) What is the length of the shortest path from I to J? _____Write the path here: _____

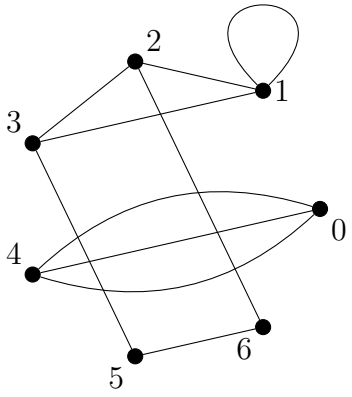
   (j) Find a circuit in the graph and highlight it on the graph. Write the circuit here: _____

   (k) Find a path that visits every vertex exactly once. Highlight it on the right-hand copy of the graph.

   (l) Explain why you can't find a circuit that passes through every vertex of the graph.

   (m) Create a context for this graph. What might the vertices represent? What might the edges represent?

2. Here's a second graph, Graph R.



(a) Explain why this graph is not connected.

A *connected component* is a piece of a graph that *is* connected. To the right of the graph, draw the two connected components of graph R separately, with no crossing edges. (You will need to change the position of the vertices and edges!)

(b) Label each vertex with its degree.

(c) How many edges does graph R have? _____

(d) Using the above graph R and the previous graph Q, fill in the following table:

Graph	sum of the degrees	number of edges
Graph Q		
Graph R		

What do you notice about the relationship between the sum of the degrees and the number of edges?