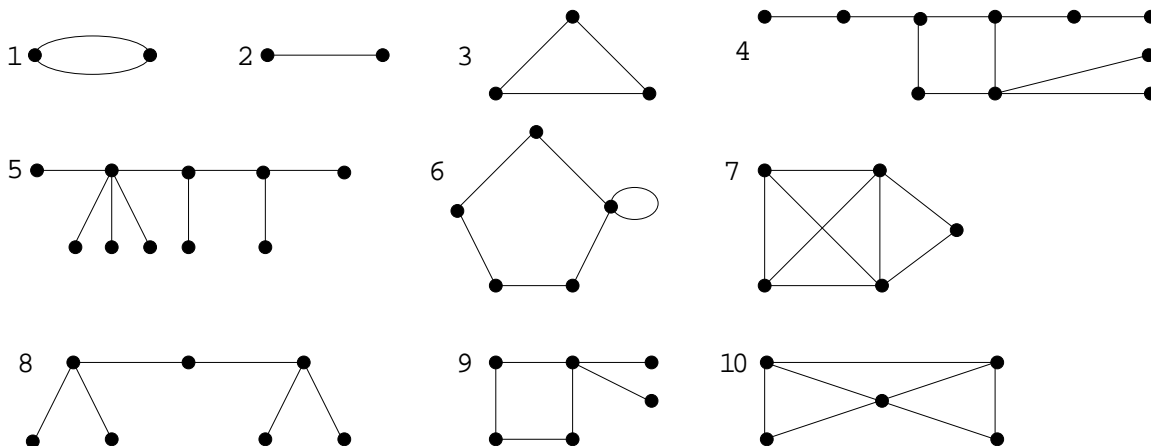


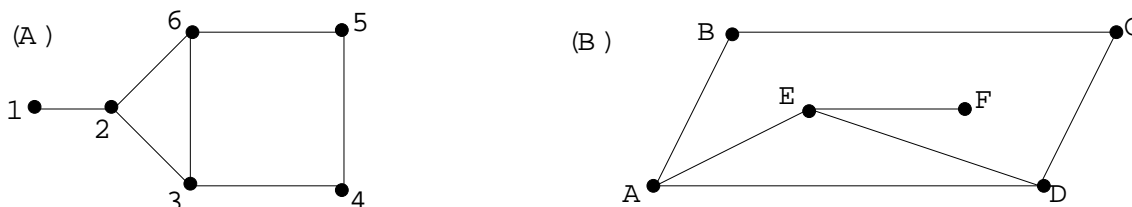
1. Write the degree of each vertex beside each vertex for the 10 graphs below.



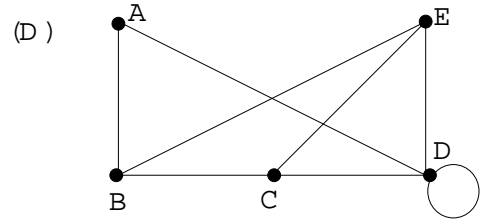
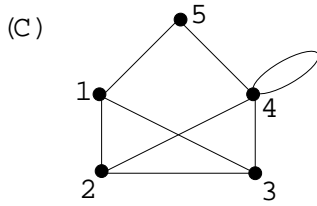
2. Fill in the following table. The Degree Sum is obtained by adding up the degree(s) of all the vertices for a particular graph.

Graph (G)	Number of edges (E)	Number of vertices (V)	Number of vertices of odd degree	Number of vertices of even degree	Degree Sum (N_G)
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

- Do you notice something special about the numbers in the last column in relation to any of the other columns? Write down what you notice as a simple formula for N_G . If you don't notice something special, look again, and if you still don't notice then seek help from a colleague or from a demonstrator. See the solution sheet for a proof of the formula.
- Do you notice something special about one of the first four columns that you filled in? Write down your observation as a conjecture. If you don't notice something special, look again, and if you still don't notice then seek help from a colleague or from a demonstrator. See the solution sheet for a proof of the conjecture.
- Find 2 isomorphisms from graph (A) to graph (B)

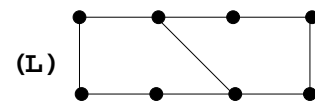
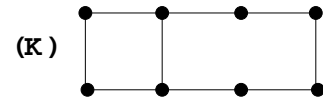
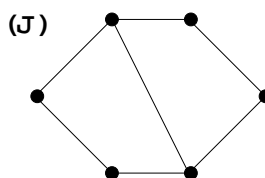
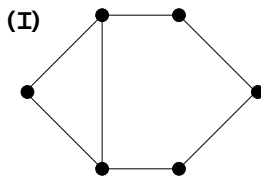
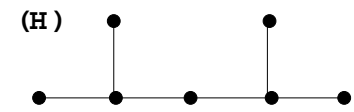
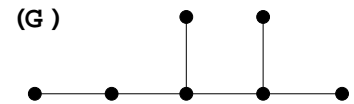
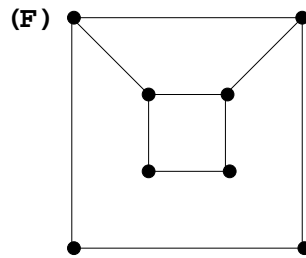
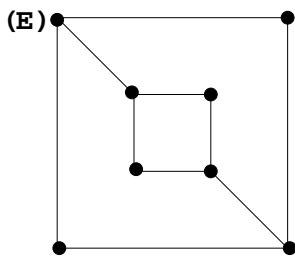


6. Find 2 isomorphisms from graph (C) to graph (D)



7. (a) Write down the adjacency matrix for Graph (C) when the vertices are listed in numerical order.
 (b) Write down the adjacency matrix for Graph (D) when the vertices are listed in alphabetical order.
 (c) Is there an ordering of the vertices for Graph (D) which gives the same adjacency matrix as was obtained in (a)? If so, give a suitable ordering and, if not, explain why not.

8. Begin by writing the degree of each vertex beside each vertex. Then for the following pairs of graphs, give an isomorphism invariant which distinguishes: (E) & (F), (G) & (H), (I) & (J), (K) & (L): i.e. which shows that the pairs of graphs are not isomorphic.



9. (a) Write down the adjacency matrices for Graph (M) and Graph (N).
 (b) Decide if these graphs are isomorphic. Justify your answer. The adjacency matrix may not be much help.

