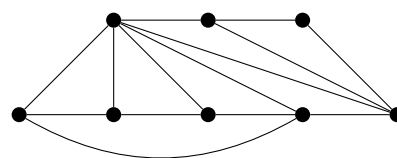
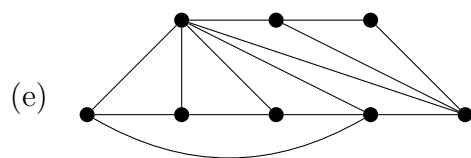
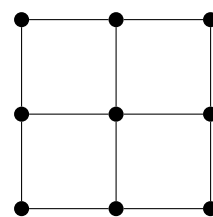
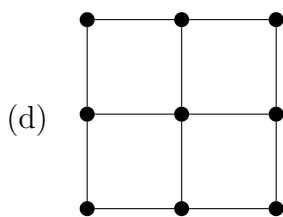
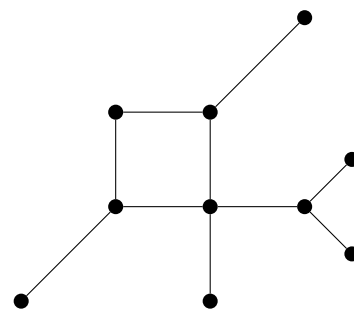
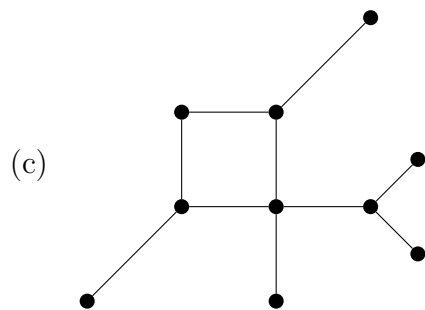
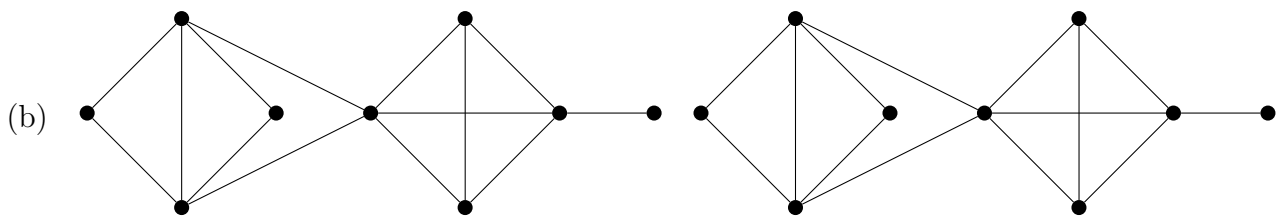
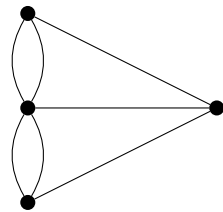
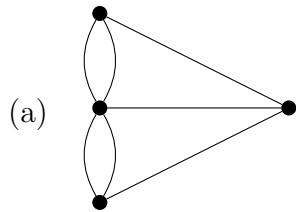


## Eulerizations and Trees

1. Find an Eulerization and a Semi-Eulerization for the following graphs:

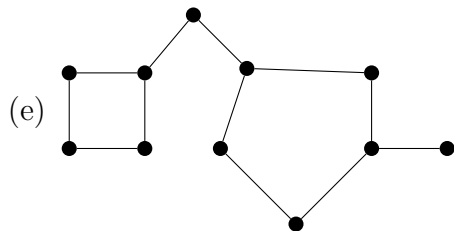
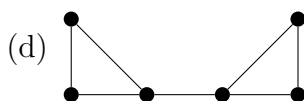
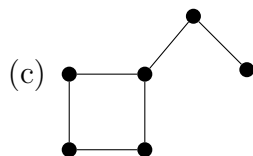
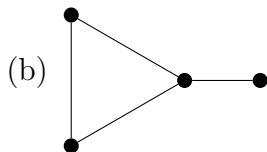
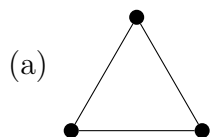


- 
2. (a) Draw a connected graph with 4 vertices *and no circuits*. How many edges does it have?
- (b) Draw a connected graph with 5 vertices *and no circuits*. How many edges does it have?
- (c) Draw a connected graph with 6 vertices and 5 edges. Does it have any circuits?
- (d) Draw a connected graph with 7 vertices and 6 edges. Does it have any circuits?

A **tree** is a connected graph (network) with no circuits. Any tree with  $N$  vertices has  $N - 1$  edges, and any connected graph (network) with  $N$  vertices and  $N - 1$  edges is a tree!

A **spanning tree** of a network is a subgraph (graph within a graph) that connects all the vertices of the network but has no circuits.

3. How many spanning trees are there in each of the following graphs?



## Kruskal's Algorithm

4. For each of the following graphs, find a connected spanning subgraph with as small a total weight as possible. Draw your answer in the right-hand set of vertices, and calculate the total weight of your spanning subgraph.

