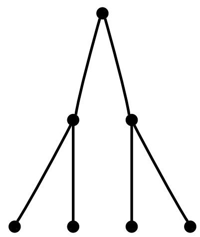
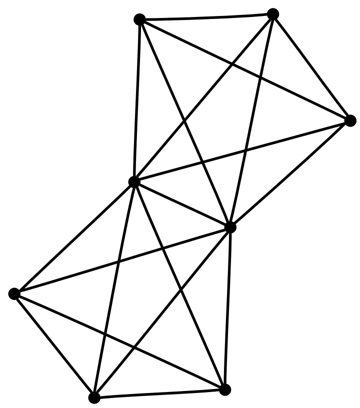
1. **(20 points)** For each of the following graphs G, determine the coloring number $\chi(G)$, connectivity $\kappa(G)$, clique number $\omega(G)$, whether it has an Eulerian tour, and whether it has a perfect matching.

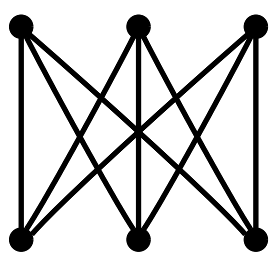
(a)



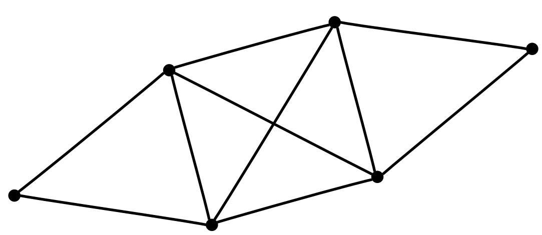
(b)



(c)



(d)



2. **(40 points)** For each of the following statements, either prove it (if true) or give a counterexample (if false).

   (a) If G is a simple graph on $2n$ vertices, and G is n-connected, then G has a perfect matching.

   (b) If G is a 2-connected graph, and if H is a connected induced subgraph of G, then H is 2-connected.

   (c) If $\chi(G) = 4$, then G contains a clique of size 4.

   (d) If G is k-connected, then no vertex in G has degree of less than k.