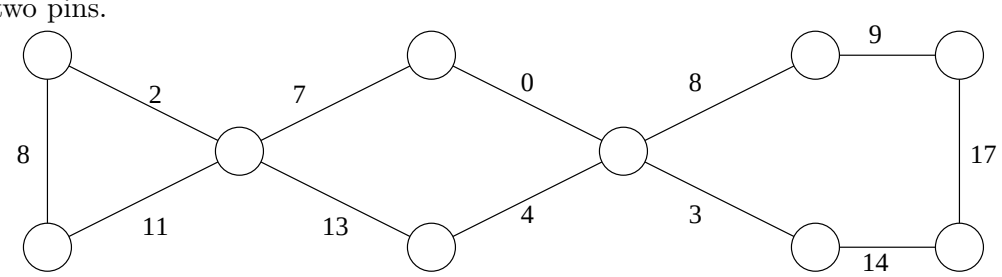
CS 41

1. A *bike-chain graph* is an undirected weighted graph consisting of simple cycles called *links*. Two links have a single vertex in common. Such a vertex is called a *pin*. Pins have degree four while all other vertices have degree two. The following is an example of a bike-chain with three links and two pins.



   (a) Assume that a bike-chain graph G has k links, n vertices, and m edges. Give m as a function of k and n.

   (b) Describe and analyze an efficient algorithm for computing the minimal spanning tree of G.

2. Let G be an undirected graph with n vertices. What is the minimum degree k such that if each vertex has degree at least k, then the graph G **must** be connected (consist of a single component). Prove your answer. You may assume there is at most one edge (u, v) connecting vertices u and $v \in G$, and there are no loop edges of the form (u, u).

3. CLRS 22.4-2

4. CLRS 23.1-8

5. CLRS 24.3-4