Pre-lecture exercises will not be collected for credit. However, you will get more out of each lecture if you do them, and they will be referenced during lecture. We recommend **writing out** your answers to pre-lecture exercises before class. Pre-lecture exercises usually should not take you more than 30 minutes.

For each of the following real-world problems, try to formulate this as a problem about *graphs*. We'll talk about graphs formally in class, but for now, a graph is just a collection of vertices and edges.

What algorithmic problem about graphs do we need to solve in order to solve the following problems? (Note, you don't actually have to solve these problems, just transform them into graph problems that we might then be able to solve).

1. Among actors, a "Bacon number" is the number of degrees of separation from an actor to Kevin Bacon. For example, Kevin Bacon's Bacon number is 0. If an actor works in a movie with Kevin Bacon, the actor's Bacon number is 1. If an actor A works with an actor B who worked with Kevin Bacon in a movie, then actor A's Bacon number is 2, and so forth.

   (a) What is Samuel L. Jackson's Bacon number?

   (b) list all the people with Bacon number equal to 6.

2. You need to take a bunch of classes at Stanford, and some of them depend on each other. For example, you must take CS 103 before taking CS 161. Given a set of classes you need to take, and information about which class is a pre-requisite for which other class, generate an order in which to take all of the classes. Assume you can only take one class at a time.

3. You are about to purchase a bunch of fish. You have two very large fishtanks. Unfortunately, some of these species of fish will fight if they are put in the same tank. For each pair of species, you know whether they will fight or whether they will peacefully co-exist. Find a way to separate the fish into two peaceful fishtanks if it exists.