Homework #5

26. We're going to define the minimum vertex cover problem in terms of integer linear programming.
First, we define our variables.
For a graph with n vertices, we have n variables x_i that can be either 1 or 0. We say $x_i = 1$ if i is included in the vertex cover, and is 0 otherwise.
The objective function that we're trying to minimize is $\sum_{i=0}^{n} x_i$; that is, we want to have the least number of vertices in the cover possible.
The constraint is that every edge must be incident to a vertex in the cover. In other words, if we have edges in the form $(u,v), u,v \in V$, then $x_u + x_v \geq 1 \ \forall (u,v) \in E$. This makes sure that each edge is touched by a vertex in the cover. ■