

In the set cover problem, the goal is to find a collection of subsets indexed by  $I$  that minimizes  $\sum_{j \in I} w_j$  such that,

$$| \cup_{j \in I} S_j | = |E|$$

Consider the partial cover problem, in which one finds a collections of subsets indexed by  $I$  that minimizes  $\sum_{j \in I} w_j$  such that,

$$| \cup_{j \in I} S_j | \geq p|E| ,$$

Where  $0 < p < 1$  is a constant.

Express this problem as a linear program.