Definition 1. Recall that a cut in a graph $G = (V, E)$ is a partition of $V$ into two disjoint sets $S$ and $T$. We denote the cut between $S$ and $T$ by $(S, T)$. We say that an edge $e = (u, v) \in E$ is cut by $(S, T)$ if one endpoint of $e$ lies in $S$ and the other lies in $T$ (that is, if either $u \in S$ and $v \in T$ or $u \in T$ and $v \in S$). The size of the cut is the number of edges cut by the cut.

Problem 1. Design an algorithm that given a graph $G = (V, E)$ finds a cut $(S, T)$ of size at least $|E|/2$ in $G$. (Note that there might be many cuts of size at least $|E|/2$; the algorithm needs to find just one of them.) What is the running time of your algorithm?

Problem 2. We are given a set of $n$ jobs $\{1, \ldots, n\}$. Each job $i$ has start time $s(i) \geq 0$ and processing time $t(i) > 0$. Only one job can run on one machine at a given time. Determine the minimum number of machines required to schedule all the jobs. Also find the optimal schedule (the map from jobs to machines).

This problem is discussed in Kleinberg and Tardos on pp. 122–125.