1. From Dasgupta et al. Given an undirected graph $G$ in which each node has degree at most $d$, show how to efficiently find an independent set whose size is at least $1/(d + 1)$ times the size of the largest independent set of $G$. An independent set in an undirected graph is a set of nodes, no two of which are connected by an edge.

2. Recall that an instance of the Knapsack problem consists of $n$ items, where each item $i$ has a positive integer weight $w_i$ and a positive integer value $v_i$. The instance also includes a positive integer capacity $W$, which is the maximum weight of items that can be put in the knapsack. The goal is to find a subset $S$ of items of maximum value, such that the total weight of the items in $S$ is at most $W$. What can you say about a performance guarantee for the following simple greedy algorithm for Knapsack?

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Greedy-Knapsack(S, W):
    Sort the items in decreasing order of the ratio $v_i/w_i$
    $S \leftarrow \emptyset$  // $S$ is the items in the knapsack
    $V \leftarrow 0$  // $V$ is the total value of the items in the knapsack
    for i from 1 to n
        if $S + w_i > W$ return $S$
        $S \leftarrow S \cup \{i\}$
        $V \leftarrow V + v_i$
    return $S$
```

3. Kleinberg and Tardos, Chapter 11, Problem 6. Consider the following generalization of the load balancing problem. There are $m$ slow machines and $k$ fast machines. You are given $n$ jobs; job $i$ takes time $t_i$ on a slow machine and just $t_i/2$ time on a fast machine. Your want to assign jobs to machines so as to minimize the makespan—the maximum, over all machines, of the total processing time of jobs assigned to the machine. Give a polynomial-time algorithm that produces an assignment of jobs to machines with a makespan that is at most three times the optimum.