Algorithms Tutorial 2

Question 0.1. *Given a set S of n items, where item i has weight $w_i \geq 0$, value $v_i \geq 0$, and a bound $W \geq 0$. Design an $O(nW)$ time algorithm to select a subset T of S so that $\sum_{i \in T} w_i \leq W$ and $\sum_{i \in T} v_i$ is maximized. Assume that the weights and values are integral.*

This is the example on pg. 271 of the Kleinberg & Tardos book.

Question 0.2. *Given a total of n courses each with a grade on a scale of $[1, g]$ ($g > 1$) and a map f such that $f(i, t)$ is the grade one obtains by studying t hours for course i. Suppose $H > 0$ hours are available for studying. Design a polynomial (in g, n, H) algorithm to determine the maximum average grade. Assume that f is non-decreasing w.r.t. t, also assume that g, H are integers and that you spend an integer number of hours on each course.*

This is problem 20 on pg. 329 of the Kleinberg & Tardos book.