Homework IV

1. You are given a set of intervals, $I_1, \ldots, I_k$, where each interval $I_i = [s_i, e_i]$ has an associated profit p_i. Give an efficient algorithm for finding a subset of intervals of maximum total profit satisfying the property that for any time t, there are at most 3 intervals in this subset which contain t.

2. You are given N boxes, where box i has height h_i, width w_i and length l_i. Give an algorithm for finding a stacking of a subset of boxes of maximum total height : box i can be stacked on top of box j if $w_i < w_j$ and $l_i < l_j$.

3. You are given a tree T where each vertex v has an associated weight w_v. We say that a subset W of vertices in T is *nice* if no two vertices in W are joined by an edge. Give an algorithm for finding a nice subset of vertices of maximum total weight in T.