1 Standard 3- Exchange Arguments

1.1 Problem 1

Problem 1. Suppose that there are n homework assignments, where the ith homework assignment has difficulty $d_i > 0$. All of the assignments are released on the first day of class, and you may turn in one assignment per week. If you turn in assignment i on week k, then you receive $(n - k)e^{d_i}$ points. Do the following.

(a) Consider a solution in which you turn in assignment j before assignment i, even though $d_i > d_j$. Show that you can increase the number of points earned by turning in assignment i before assignment j.

   Proof. Let $d_i = 2$ and $d_j = 1$ which holds for the assumption that $d_i > d_j$
   If you turn in assignment i first then you receive
   (n-k)2 points.
   But if you turn in assignment j first you receive
   (n-k)*1 points which is 2 times as little the points you would receive from turning in assignment i first. □

(b) Using part (a), describe a greedy algorithm to order the assignments in order to maximize the number of points earned. Pseudo-code is not required, but you should provide enough detail that a CSCI 2270 student could reasonably be expected to implement the solution from your description.

   Answer. If you choose the most difficult assignment and turn it in first and continue to turn in the most difficult assignment avalible until tou end up doing the least difficult last you will maximize the number of points earned. □

2 Corrections

Proof. a) In this problem I gave an example of when the statement was true to prove that the statement was true. That is not a viable form to prove correctness. Instead I should have made equations for the two scenarios and subtracted the number of points earned in the second scenario by the number of points earned in the first scenario.

   b) For this I gave a partial answer. I was right in saying that you start with the most difficult assignment and work your way down to the least difficult assignment. Where I failed was in describing the actual algorithm. I should have added onto the part about starting with the most difficult that you every week you remove the homework you just did and calculated the number of points add that to a stored value and repeated. □