

CMPS 102 — Fall 2018 — Homework 3

"I have read and agree to the collaboration policy." - Kevin Wang

Solution to Problem 3: Furniture Transfer

Given a sequence of chairs with size s_1, s_2, \dots, s_n , let David's truck have size limit S , and each chair i has size s_i .

Observation 1. The packages are loaded in order for both the greedy algorithm and the delay method.

Observation 2. Optimality is determined by $D(a)$ where D is the number of deliveries required using algorithm a .

Claim 1. *The simple greedy algorithm, g , is in fact better than the delay algorithm, d : $D(g) \leq D(d)$*

Proof. In algorithm g , if delivery k can fit the first chair from delivery $k + 1$, moving the chair s_i from delivery $k + 1$ to delivery k doesn't use more deliveries. Furthermore, it is possible that fewer deliveries are needed if s_i was the only chair in delivery $k + 1$. If algorithm d delays this chair for delivery $k + 1$ and changes nothing else, then $D(g) \leq D(d)$. \square