CS60007 Algorithm Design and Analysis 2019
Tutorial 4

There are n items whose weights are $w_1, \ldots, w_n$. They are to be loaded in trucks. Each truck can bear at most k units of weight. The task it to do this using minimum number of trucks. This task is known to be NP-hard; so a polynomial time exact algorithm is unlikely to exist. Now consider the following greedy strategy:

Keep loading items (in an arbitrary order) onto trucks; if an item is too heavy to be loaded onto the current truck, move to a new empty truck and continue.

1. Give a sequence of weights and a value of k for which the above algorithm returns sub-optimal answer.

2. Prove that the above algorithm is a 2-approximation algorithm.