Homework Assignment #7A
Due: August 7, 2018 at 7:00 p.m.

1. Linda is supervising n workers one afternoon. Linda has a list of m jobs to be done. Linda knows that job i will require t_i minutes for one worker to complete, where t_i is a positive integer for $1 \leq i \leq m$. Every worker is capable of doing every job. However, before a worker begins doing a job, Linda must spend five minutes explaining the job to the worker. Linda can only talk to one worker at a time. (As a manager, Linda herself does not do any of the jobs.) According to union rules, a worker may be asked to complete a maximum of one job during a shift: if the worker finishes before 4:00 p.m., the worker gets to go home early. All of the jobs are independent: no job must be completed (or even started) before another job can be started. The afternoon shift begins at noon and ends at 4:00 p.m. Linda's goal is to get the largest possible number of jobs completed before 4:00 p.m.

(a) Design an algorithm that finds the largest possible set of jobs that can be completed by 4:00 p.m.

(b) Prove that your algorithm is correct.

(c) What is the worst-case running time of your algorithm? State your answer using Θ notation in terms of n and m.