Greedy Scheduling

If we get rid of the assumption that all $w_i/t_i$ are unique, what changes? Which change(s) make the proof fail?
Knapsack

• If $S$ is optimal solution to $K_{n,W}$, and $n \notin S$, then ___ is optimal solution to $K_{\_,\_}$

• If $S$ is optimal solution to $K_{n,W}$, and $n \in S$, then ___ is optimal solution to $K_{\_,\_}$

• Prove each statement. Start: For contradiction, assume ___ is not optimal solution to $K_{\_,\_}$
Knapsack

- If $S$ is optimal solution to $K_{n,W}$, and $n \notin S$, then $S$ is optimal solution to $K_{n-1,W}$
- If $S$ is optimal solution to $K_{n,W}$, and $n \in S$, then $S - \{n\}$ is optimal solution to $K_{n-1,W-w_n}$
Knapsack

• If $S$ is optimal solution to $K_{n,W}$, and $n \in S$, then $S - \{n\}$ is optimal solution to $K_{n-1,W-w_n}$

Suppose for contradiction $S - \{n\}$ is not the optimal solution to $K_{n-1,W-w_n}$. Then the optimal solution $S'$ to $K_{n-1,W-w_n}$ has $V(S') > V(S)$. But then $S' \cup \{n\}$ is a solution to $K_{n,W}$ with $V(S' \cup \{n\}) > V(S)$, so $S$ is not optimal for $K_{n,W}$, a contradiction.