1. Proof that problem $O3||C_{max}$ is NP-hard
2. Find an optimal schedule for problem $O|p_{ij} = p|C_{max}$ and prove its optimality. ($p_{ij} = p$ means that all operations have processing time p)
3. Find an optimal schedule for problem $O|p_{ij} = p_j|C_{max}$ and prove its optimality. ($p_{ij} = p_j$ means that all operations of a job have the same processing time which is equal to p_j)
4. Let S be a complete selection for an instance of $J||C_{max}$ and let P be a critical path in $G(S)$. A sequence $o_1, \dots, o_k$ of successive operations in P to be processed on the same machine is called a block if $k \geq 2$ and the predecessor of o_1 and the successor of o_k in P are either on a different machine or equal to 0 or $*$.
   Proof that if another complete selection S' exists with $C_{max}(S') < C_{max}(S)$, then in S' at least one operation of some block B w.r.t. S not equal to the first has to be processed before all other operations of B or at least one operation of some block B w.r.t. S not equal to the last has to be processed after all other operations of B.
5. Let S be a complete selection for an instance of $J||C_{max}$ and let P be a critical path in $G(S)$. Show that reversing the direction of a disjunctive arc, which is part of the critical path P, leads again to a complete selection.
   Show that this in general is not true for reversing an arbitrary disjunctive arc.