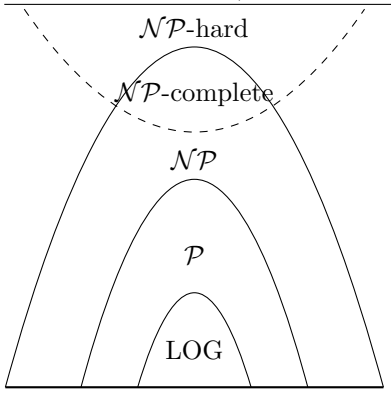
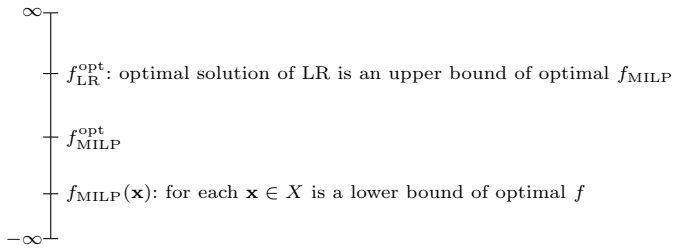
Complexity classes (the drawing assumes that $\mathcal{P} \neq \mathcal{NP}$):



Linear relaxation (LR) of a MILP problem (max f):
Bounds (for MILP that is neither infeasible nor unbounded):



Knapsack problem (an example of ILP):

- max $z = 8x_1 + 11x_2 + 6x_3 + 4x_4$;
- s.t.: $5x_1 + 7x_2 + 4x_3 + 3x_4 \leq 14$;
- $x_i \in \mathbb{B} = \{0, 1\}$, $j = 1, 2, 3, 4$.

Solution method with B&B:

1. Solution of LR: $x_1 = 1$, $x_2 = 1$, $x_3 = \frac{1}{2}$, $x_4 = 0$ i $z = 22$.
2. There is no better integral solution than 22.
3. If for optimal solution of LR $x_4 = 0$, it does not mean that in the optimal solution of the ILP problem it will be the same!
4. Further steps: