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Algorithms and Uncertainty
Winter Term 2024/25
Tutorial Session - Week 2

Exercise 1:
Consider the following Set Cover instance: $U = \{1, 2, 3\}$ and $\mathcal{S} = \{A, B, C\}$ with $A = \{1, 2\}$, $B = \{1, 3\}$, $C = \{2, 3\}$, $c_A = c_B = 3$, $c_C = 4$.

(a) Give an optimal integral solution.

(b) Give a fractional primal solution of cost at most 5.

(c) Give a dual solution of value at least 5.

(d) Use your solution of (c) to show optimality of your solution of (b). To this end, sum up the primal constraints in a suitable way. (Your solution should be in the spirit of proof of weak duality but not use the statement of the lemma itself.)