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## Efficient Algorithms and Datastructures II

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### Aufgabe 1 (10 Punkte)

Is it possible that a Linear Program (P) and its Dual (D) are both infeasible? Why or why not?

### Aufgabe 2 (10 Punkte)

Solve the following LP:

$$\begin{array}{ll} \text{maximize} & x_1 - x_2 + x_3 \\ \text{subject to} & \\ & 2x_1 - x_2 + 2x_3 \leq 4 \\ & 2x_1 - 3x_2 + x_3 \leq -5 \\ & -x_1 + x_2 - 2x_3 \leq -1 \\ & x_1, x_2, x_3 \geq 0 \end{array}$$

### Aufgabe 3 (10 Punkte)

Find the dual (D) of the following Linear Program (P):

$$\begin{array}{ll} \text{maximize} & -x_1 + x_2 \\ \text{subject to} & \\ & -x_1 \leq -1 \\ & x_2 \leq 1 \\ & x_1, x_2 \geq 0 \end{array}$$

Show that the solution to (D) and (P) is the same without using Strong Duality or finding the dual of (D).