The problem can be submitted until March 1, 12 :00 noon, either at the exercise session or into the box in front of MA C1 563.

Student(s) [1] :

Question 1 : *The question is worth 5 points.*

☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	*Reserved for the corrector*

Let $P = \{x \in \mathbb{R}^n : Ax \leq b\}$ be a bounded, non-empty set. Formulate a linear program that computes the radius of the largest ball that can be inscribed into P.

Sol.: *A ball of radius r and center x is contained in P if and only if $x \in P$ and x has distance at least r from any hyperplane defining P. Hence we obtain the following linear program :*

$$\begin{array}{ll} \max & r \\ s.t. & \frac{b_i - a_i x}{||a_i||} \geq r \quad \forall i = 1, \ldots, m \\ & Ax \leq b \end{array}$$

where $a_1, \ldots, a_m$ are the rows of A and $b = (b_1 \ldots b_m)^\top$.

1. You are allowed to submit your solutions in groups of at most three students.