# HW1: Convex sets

Matrix

January 3, 2024

Homework 1, due Friday 7/1/22: 2.9, 2.12a-e, 2.15, 2.4, A1.4, A2.7, 2.13.
**2.9(a).**

$$\|x - x_0\|_2 \leq \|x - x_i\| \implies (x_i - x_0)^T x \leq (x_i - x_0)^T (x_i + x_0).$$

Let $a_i = (x_i - x_0)$ and $b_i = (x_i - x_0)^T (x_i + x_0)$, then we get $A = [a_1, a_2, \ldots, a_K]^T$ and $b = [b_1, b_2, \cdots, b_K]^T$ subject to $V = \{x \mid Ax \preceq b\}$. Therefore $V$ is a polyhedron. $\square$