On the feasibility for the system of quadratic equations MATLAB Library

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1 Notations

The goal of the project is to solve a number of tasks for quadratic maps, which are

1. (Real case) The map $f\colon \mathbb{R}^n \to \mathbb{R}^m$ s.t.
$$f_i(x) = x^T A_i x + 2b_i^T x,\ A_i = A_i^T$$
2. (Complex case) The map $f\colon \mathbb{C}^n \to \mathbb{R}^m$ s.t.
$$f_i(x) = x^* A_i x + b_i^* x + x^* b_i,\ A_i = A_i^*$$
Where $\cdot^*$ is Hermitian transpose.

We use the following notations:

Definition 1.1. For a vector $c \in \mathbb{R}^n$ and tuple of matrices $(A_1, ..., A_n)$ (or vectors) the dot product is defined as following:
$$c \cdot A = \sum_{i=1}^{n} c_i A_i$$

Definition 1.2. The image of f is denoted as F:
$$F = f(\mathbb{R}^n)$$

Definition 1.3. The convex hull of F is denoted as G:
$$G = \operatorname{conv} F$$

2 Functions

3 Example