1. Let $A \in \mathbb{Q}^{n \times n}$ be a regular matrix. Show that $\text{size}(A^{-1}) \leq 4n^2 \text{size}(A)$. (2 points)

2. Define $\|A\| := \max_{\|x\|=1} \|Ax\|$ for $A \in \mathbb{R}^{n \times n}$, where $\|\cdot\| : \mathbb{R}^n \to \mathbb{R}$ is the standard Euclidean norm. Prove:
   (a) $\|A\|$ is a norm
   (b) $\|aa^T\| = a^T a$
   (c) $\|A\| = \max\{x^T Ax \mid \|x\| = 1\}$ if $A$ is positive semidefinite
   (d) $\|A\| \leq \|A + B\|$ if $A$ and $B$ are positiv semidefinite. (2+2+2+2 points)

3. Let $P \subset \mathbb{R}^d$ be a finite set of points and let $B$ be a ball containing $P$. Show: $B$ is a minimum radius ball containing $P$ if and only if the center of $B$ lies in $\text{conv}(P \cap \partial B)$, where $\partial B$ is the border of the ball. (5 points)

Due date: Tuesday, May 28, 2019, before the lecture.