Homework 1 :: MATH 504 :: Due Tuesday, Sept 13th, 11:59 pm

Your homework submission must be a single pdf called "LASTNAME-hw1.pdf" with your solutions to all theory problem to receive full credit. All answers must be typed in Latex. Submission should be done on Canvas.

1. Geometrically describe with reasoning the following unit ball in $\mathbb{R}^2$

$$B_\infty(1) = \{x \in \mathbb{R}^2 : \quad \|x\|_\infty \leq 1\}.$$

2. Prove the following triangle inequality

$$\|x + y\|_2 \leq \|x\|_2 + \|y\|_2, \qquad \forall x, y \in \mathbb{R}^n.$$

   When does the equality hold?

3. Prove that for any matrix $A = [a_{i,j}]_{m \times n}$, the matrix $A^\mathsf{T} A$ is symmetric.