Math 115A: Problem set 7

Sections 1 and 3. Instructor: James Freitag

Due 11/25

Problem 1 Inner product?

Is there an inner product on $\mathbb{R}^2$ such that the associated norm satistisfies

$$||(x, y)|| = |x| + |y|$$

for all $x, y \in \mathbb{R}$? Prove there is such an inner product or prove there is not.

Problem 2 Inner product formula

Let V be a finite dimensional inner product space over $\mathbb{R}$. Let $u, v \in V$. Prove that $\langle u, v\rangle = 0$ if and only if $||u|| \leq ||u + \alpha v||$ for all $\alpha \in \mathbb{R}$.

Problem 3 Inner product formula

Let V be a finite dimensional inner product space over $\mathbb{R}$. Let $v, w \in V$. Show that

$$\langle u, v\rangle = \frac{||u + v||^2 - ||u - v||^2}{4}.$$

Problem 4 Exercises from the book

Do the following exercises from book:

- Problems 2,3,8,10 from section 6.1.