

# MATH 411 Notes

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## 1 Preliminaries

**Definition 1.1.**  $\mathbb{R}^n = \{(u_1, u_2, \dots, u_n) : u_i \in \mathbb{R} \forall i\}$

**Definition 1.2.** Let  $u, v \in \mathbb{R}^n$ .  $\langle u, v \rangle = u_1v_1 + u_2v_2 + \dots + u_nv_n$

**Theorem 1.1.** Let  $u, v \in \mathbb{R}^n$ . Then  $|\langle u, v \rangle| \leq \|u\| \|v\|$ .

*Proof.* Minimize  $\|u - \lambda v\|^2$  wrt  $\lambda$ .

□