Real Analysis 2, MATH 5220, Spring 2023

Homework 9, Section 5.2. Inner Product Spaces (of Hong, Wang, Gardner)

Due Saturday, March 25, at 11:59 p.m.

Write in complete sentences!!! *Explain* what you are doing and convince me that you understand what you are doing and why. Justify all steps by quoting relevant results from the textbook, class notes, or hypotheses. Do not copy the work of others; **do your own work!!!**

5.2.5(a). Prove that equality holds in The Schwarz Inequality (Theorem 5.2.1), $|\langle \mathbf{u}, \mathbf{v} \rangle| = \|\mathbf{u}\|\|\mathbf{v}\|$, if and only if $\mathbf{u}$ is a scalar multiple of $\mathbf{v}$.

5.2.5(b) Equality holds in the Triangle Inequality (Theorem 5.2.2), $\|\mathbf{u} + \mathbf{v}\| \leq \|\mathbf{u}\| + \|\mathbf{v}\|$, if and only if $\mathbf{u}$ is a nonnegative scalar multiple of $\mathbf{v}$.