Math 421 / Homework 8.1

 # 3 Show that the equality in the Cauchy-Schwarz Inequality holds if and only if $\mathbf{x} = 0$, $\mathbf{y} = 0$, or $\mathbf{x}$ is parallel to $\mathbf{y}$.

 # 4(b) If $\theta \in [0, \pi]$ is the angle between two nonzero vectors $\mathbf{a}$ and $\mathbf{b}$ in $\mathbf{R}^n$, show that $\mathbf{a}$ and $\mathbf{b}$ are parallel if and only if $\theta = 0$ or π, and that $\mathbf{a}$ and $\mathbf{b}$ are orthogonal if and only if $\theta = \pi/2$.

 # 9 Suppose that (a_k) and (b_k) are sequences of real numbers which satisfy

$$\sum_{k=1}^{\infty} a_k^2 < \infty \quad \text{and} \quad \sum_{k=1}^{\infty} b_k^2 < \infty.$$

Prove that the infinite series $\sum_{k=1}^{\infty} a_k b_k$ converges absolutely.