Homework 6

A portion of the following problems will be graded according to the provided rubric.

1. Rudin pg 78 problem 6abc
2. Rudin pg 78 problem 7
3. Rudin pg 79 problem 9
4. If $\sum_{n=1}^{\infty} a_n = A$ prove $\sum_{n=1}^{\infty} ca_n = cA$ for all $c \in \mathbb{R}$.
5. Give a proof for the Comparison Test using the Monotone Convergence Theorem.
6. Prove that if $\sum_{n=1}^{\infty} x_n$ converges absolutely and the sequence $\{y_n\}$ is bounded, then $\sum_{n=1}^{\infty} x_n y_n$ converges.
7. Give an example of each of the following or explain why such a request is impossible.
    a. Two series $\sum x_n$ and $\sum y_n$ that both diverge, but where $\sum x_n y_n$ converges
    b. A convergent series $\sum x_n$ and a bounded sequence $\{y_n\}$ such that $\sum x_n y_n$ diverges
    c. Two sequences $\{x_n\}$ and $\{y_n\}$ where $\sum x_n$ and $\sum (x_n + y_n)$ both converge but $\sum y_n$ diverges.