6. [15 points] For each of the following, assume that $\sum a_n$ and $\sum b_n$ are both convergent series, and that $a_n > b_n > 0$. For each, explain your answer in a sentence or two, or with a clear picture or counterexample.

a. [3 points] Is $\sum (b_n - a_n)$ a convergent series? Explain.

b. [3 points] Is $\sum (a_n \cdot b_n)$ a convergent series? Explain.

c. [3 points] Is $\sum ((-1)^n \ln(a_n + 1))$ a convergent series? Explain.

d. [3 points] Is $\sum (2\, a_n)$ a convergent series? Explain.

e. [3 points] Is $\sum ((-1)^n \sqrt{b_n}\,)$ an absolutely convergent series? Explain.