

13. [10 points] Suppose  $a_n$  and  $b_n$  are sequences with the following properties.

•  $\sum_{n=1}^{\infty} a_n$  converges.

•  $n \leq b_n \leq e^n$ .

For each of the following statements, decide whether the statement is always true, sometimes true, or never true. Circle your answer. No justification is necessary. **You only need to answer 5 of the 7 questions.** Only answer the 5 questions you want graded. If it is unclear which 5 questions are being answered, the first 5 questions you answer will be graded.

a. [2 points] The sequence  $\frac{1}{b_n}$  diverges.

ALWAYS

SOMETIMES

NEVER

b. [2 points] The sequence  $a_n$  is bounded.

ALWAYS

SOMETIMES

NEVER

c. [2 points] The series  $\sum_{n=1}^{\infty} \frac{1}{b_n}$  diverges.

ALWAYS

SOMETIMES

NEVER

d. [2 points] The series  $\sum_{n=1}^{\infty} e^{-a_n}$  converges.

ALWAYS

SOMETIMES

NEVER

e. [2 points] The series  $\sum_{n=1}^{\infty} a_n^2$  diverges.

ALWAYS

SOMETIMES

NEVER

f. [2 points] The series  $\sum_{n=1}^{\infty} a_n b_n$  converges.

ALWAYS

SOMETIMES

NEVER

g. [2 points] The series  $\sum_{n=1}^{\infty} \frac{b_n}{n!}$  converges.

ALWAYS

SOMETIMES

NEVER