

9. [12 points] Suppose that a_n and b_n are sequences with the following properties:

- $\sum_{n=1}^{\infty} (-1)^n a_n$ converges.
- $\frac{1}{n^2} \leq b_n \leq \frac{1}{\sqrt{n}}$ for all $n \geq 1$.

For the following questions, determine if the statement is ALWAYS true, SOMETIMES true, or NEVER true, and circle the corresponding answer. Justification is not required.

a. [2 points] The sequence a_n diverges.

Circle one: ALWAYS SOMETIMES **NEVER**

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

Circle one: ALWAYS **SOMETIMES** NEVER

c. [2 points] The series $\sum_{n=1}^{\infty} (a_n)^2$ converges.

Circle one: ALWAYS **SOMETIMES** NEVER

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

Circle one: ALWAYS **SOMETIMES** NEVER

e. [2 points] The series $\sum_{n=1}^{\infty} (b_n)^3$ converges.

Circle one: **ALWAYS** SOMETIMES NEVER

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

Circle one: ALWAYS SOMETIMES **NEVER**