

8. [12 points] Suppose  $a_n$  and  $b_n$  are sequences of positive numbers with the following properties.

- $\sum_{n=1}^{\infty} a_n$  converges.
- $\sum_{n=1}^{\infty} b_n$  diverges.
- $0 < b_n \leq M$  for some positive number  $M$ .

For each of the following questions, circle the correct answer. No justification is necessary.

a. [2 points] Does the series  $\sum_{n=1}^{\infty} a_n b_n$  converge?

Converge

Diverge

Cannot determine

b. [2 points] Does the series  $\sum_{n=1}^{\infty} (-1)^n b_n$  converge?

Converge

Diverge

Cannot determine

c. [2 points] Does the series  $\sum_{n=1}^{\infty} \sqrt{b_n}$  converge?

Converge

Diverge

Cannot determine

d. [2 points] Does the series  $\sum_{n=1}^{\infty} \sin(a_n)$  converge?

Converge

Diverge

Cannot determine

e. [2 points] Does the series  $\sum_{n=1}^{\infty} (a_n + b_n)^2$  converge?

Converge

Diverge

Cannot determine

f. [2 points] Does the series  $\sum_{n=1}^{\infty} e^{-b_n}$  converge?

Converge

Diverge

Cannot determine