

10. [12 points] Suppose that $g(x)$ and $h(x)$ are positive continuous functions on the interval $(0, \infty)$ with the following properties:

- $\int_1^\infty g(x) dx$ converges.
- $\int_0^1 g(x) dx$ diverges.
- $e^{-x} \leq h(x) \leq \frac{1}{x}$ for all x in $(0, \infty)$.

For each of the following questions, circle the correct answer.

- a. [2 points] Does the integral $\int_1^\infty h(x)^2 dx$ converge?

Converge

Diverge

Cannot determine

- b. [2 points] Does the integral $\int_0^1 h(x) dx$ converge?

Converge

Diverge

Cannot determine

- c. [2 points] Does the integral $\int_1^\infty h(1/x) dx$ converge?

Converge

Diverge

Cannot determine

- d. [2 points] Does the integral $\int_0^1 g(x)h(x) dx$ converge?

Converge

Diverge

Cannot determine

- e. [2 points] Does the integral $\int_1^\infty g(x)h(x) dx$ converge?

Converge

Diverge

Cannot determine

- f. [2 points] Does the integral $\int_1^\infty e^x g(e^x) dx$ converge?

Converge

Diverge

Cannot determine