

1. Determine whether the following improper integrals converge or diverge.

(a) $\int_1^{\infty} \frac{\ln x}{x} dx$.

(b) $\int_1^{\infty} \frac{\ln x}{\sqrt{x}} dx$ (Compare it with part (a).)

(c) $\int_1^{\infty} \frac{\ln x}{x^3} dx$ (Compare it with ...)

(d) Explain why comparisons with (a), (b) cannot help you with (c).

2. Let R be the region in the first quadrant bounded by the x -axis, the y -axis, and the curve $y = e^{-x}$. Consider the solid S generated by revolving R about the x -axis.

(a) Is the volume of S finite?

(b) Is the surface area of S finite?