

A Second Type of Impropropriety

1. Identify why each of the following integrals is improper. Then determine if they converge or diverge.

(a) $\int_0^9 \frac{dx}{\sqrt{x}}$

(b) $\int_{-2}^3 \frac{dx}{x^4}$

(c) $\int_0^\pi \tan x \, dx$

2. Suppose $f(x)$ and $g(x)$ are both undefined at $x = a$, but $\int_a^b f(x) \, dx$ and $\int_a^b g(x) \, dx$ converge. Use limit laws to prove $\int_a^b f(x) + g(x) \, dx$ converges.