Lema

$\alpha \in (0, \infty)$

(i) $$\int_0^1 \frac{1}{x^\alpha} dx = \begin{cases} \frac{1}{1-\alpha}, & 0 < \alpha < 1 \\ +\infty, & \alpha \geq 1 \end{cases}$$

(ii) $$\int_1^\infty \frac{1}{x^\alpha} dx = \begin{cases} \frac{1}{\alpha - 1}, & 1 < \alpha \\ +\infty, & 0 < \alpha \leq 1 \end{cases}$$