Let $u = x^4$

then $du = 4x^3 dx$

$$\frac{du}{4x^3} = dx$$

and $u^{1/4} = x$

$u = 2^4 = 16$

$u = (-2)^4 = 16$

$$= \int_{16}^{16} \frac{1}{(u^2-1)} \cdot \frac{du}{4u^{3/4}}$$

but an integral $\int_a^a f(x)dx = 0$

so $\int_{-2}^{2} \frac{1}{x^8-1} dx = 0$